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BRITISH MEDICAL JOURNAL

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INFLUENCE OF GALVANIC STIMULATION ON MUSCLE ATROPHY RESULTING FROM DENERVATION

BY

E. C. S. JACKSON
Flight Lieutenant, R.A.F.V.R.

AND

H. J. SEDDON
Nuffield Department of Orthopaedic Surgery, Oxford

For many years the role of electrical stimulation in the treatment of lower motor neuron lesions has been the subject of lively controversy; and since the beginning of the war interest in this form of treatment has been quickened by the occurrence of thousands of cases of peripheral nerve injury. The results of animal experiments and of observations in man, though at times conflicting, are now consistent enough to warrant the formulation of certain conclusions.

1. Muscle atrophy begins very soon after denervation and proceeds rapidly at first, the rate gradually decreasing the longer the time after denervation.

2. Interstitial fibrosis is a constant feature of denervation atrophy and, should re-innervation occur, the greater the atrophy and fibrosis the poorer the ultimate functional recovery (Bowden and Gutmann, 1944). It is therefore logical to assume that if atrophy can be prevented or at least controlled there is a greater likelihood of recovery being satisfactory.

3. Furthermore, since there is as yet no evidence that fibrosis is irreversible, the treatment designed to prevent it should be started as soon as possible after denervation and continued until re-innervation has occurred.

4. The precise nature of denervation atrophy is still undetermined. It is reasonable to suppose that disuse and a consequent impairment of nutrition play an important part, but this is not the whole story. Fibrillation, the unceasing irregular contraction of individual muscle fibres—a phenomenon always observed in denervated muscle—has been regarded as an important factor; it has been supposed that this incessant activity tires out, and so causes atrophy of, the denervated muscle. From this it would follow that artificial stimulation of the muscle could only make matters worse.

5. Nevertheless it has been conclusively shown that muscle-wasting can in fact be controlled to a very considerable extent by repeated electrical stimulation, using a stimulus of comparatively long duration. Although galvanism has several disadvantages—the discomfort it causes being one of the most important—it is still the only type of stimulus of long duration generally available, and it was for this reason that it was used in the investigation to be described.

6. To be effective the treatment must be intensive, both in the strength of stimulus and in the number of contractions elicited at each session; it must be continued over a long period.

7. Galvanism is of greater value in the prevention of wasting when it is applied soon rather than late after denervation, though Gutmann and Guttmann (1942, 1944) found that even the most intensive treatment did not altogether prevent the atrophy that occurred in rabbits during the first few weeks after denervation.

8. In the treated muscle (Gutmann and Guttmann, 1942, 1944) the muscle fibres remain comparatively large, the interstitial tissue does not increase to any great extent, and if re-innervation occurs functional recovery is good. In untreated muscle the fibres shrink rapidly, fibrous tissue appears between them, and recovery is poor.

Unfortunately a number of factors must make us pause before concluding that equally satisfactory results will follow the employment of galvanism clinically—so much so that without some positive demonstration of its value in the treatment of patients with lower motor neuron lesions there would be little justification for recommending the general application of a treatment which is uncomfortable, time-consuming, tedious, and expensive. The rate of wasting in man at various periods after denervation is unknown. Adequate stimulation is limited by the large size of many muscles, by the pain produced by powerful electrical stimuli, and by an intolerance peculiar to certain patients whose skins are naturally sensitive or who are suffering from a nerve lesion that has itself caused cutaneous hypersensitivity.

Almost all of the methods used for the assessment of the value of galvanism in animal experiments are inapplicable in man, and it was therefore necessary to be content with a comparatively simple and not very accurate method of estimating muscle-wasting. The work about to be described was carried out by one of us (E. C. S. J.) during the period Jan., 1942, to July, 1944. The results will be reported in full elsewhere, but the importance of the conclusions to which they have led seems to be such as to warrant the immediate publication of a short undocumented account of the findings.

Method

Measurements of the volume of the hand by a simple fluid displacement method* were made in a number of cases of paralysis of muscles of the hand. In all, 164 patients were examined; in only 92 was it possible to obtain readings with sufficient frequency to be of value, and of these only 54 were suffering from complete nerve lesions. The results reported are concerned with these 54 cases. Some were treated with galvanism; in the rest stimulation was withheld though in other respects the treatment was identical.

Ulnar paralysis was present in every case; in 18% of those treated with galvanism, and in 20% of those not so treated, there was also paralysis of the muscles of the hand supplied by the median nerve. The cases were divided into groups according to the type of lesion and the time that had elapsed between injury and the first volumetric measurement. Each small group was subdivided as evenly as possible; half of the cases were treated with and the other half without galvanism. In the treated group galvanism was given on six days in each week, and each treatment consisted of 90 stimuli to each small muscle group (e.g., a pair of interossei in an intermetacarpal space), the current used being sufficient to produce a good contraction. The stimuli were given at the rate of 30 a minute, with short intervals between each group of 30 stimuli so as to avoid fatigue. Records were kept of the return of voluntary power, the electrical reactions (using Bauwens's machine), and electromyographic changes. The wasting was measured by immersing the hand in industrial alcohol up to a tattooed mark on the wrist and weighing the amount of fluid displaced. With a co-operative subject there was an error of only 0.5%. There were greater errors due to physiological variations in the volume of the hand and in some cases to unsteadiness of the patient's arm; these, however, were insignificant when compared with the changes in volume due to wasting. Since most patients were first seen some time after the original injury no attempt at absolute estimations was made; we concerned ourselves only with the changes between one examination and the next. The results reported are limited to the period

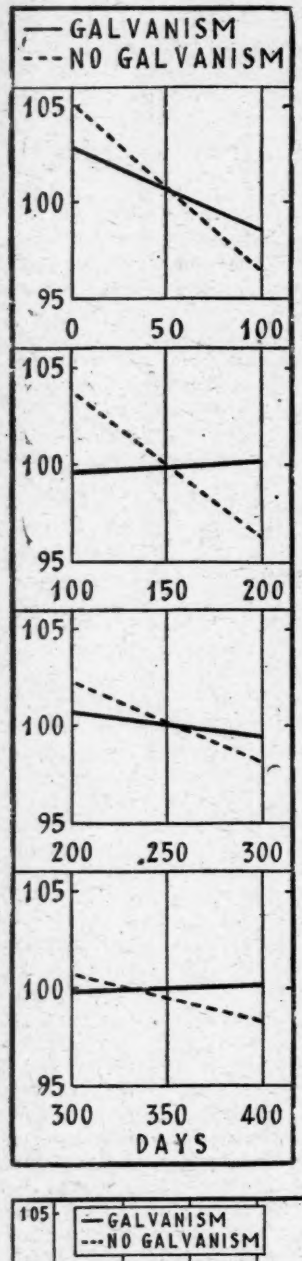
* The machine which we devised was hopelessly inaccurate, and it was impossible to proceed until a much more accurate, but still very simple, machine had been designed and made for us by Dr. K. Mendelssohn and Dr. D. S. Evans—to whom we are greatly indebted

of complete paralysis. When voluntary power is returned the progress of re-innervation is subject to so many variable factors that no definite conclusions can be drawn from the volumetric changes that occur during recovery.

Each reading was expressed as a percentage of the mean volume of the hand during the total period of observation.

Results

The results have been summarized and are shown in the accompanying Charts.

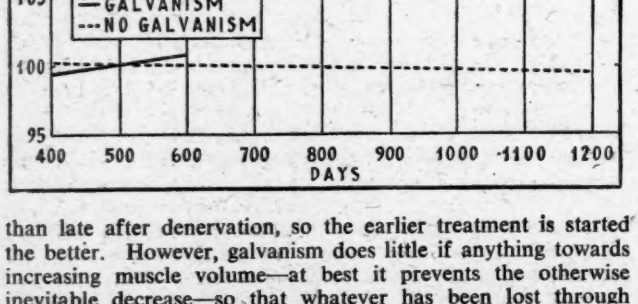


Comment on Charts.—In each period up to 400 days there was a steady loss of volume in the untreated muscles, the rate of loss gradually diminishing until, after 400 days, there was little change, the muscles having by this time wasted to such an extent that further shrinkage could hardly occur. Except during the first 100-day period, galvanism was almost completely effective in preventing wasting; but there was no increase in volume except in the 400 + day period, and here the apparent increase may have been due to chance.

Discussion

In spite of inaccuracies due to vasomotor changes, oedema, and the like — though their significance is greatly reduced when frequent volumetric measurements are made—there is no doubt that the volume of the hand is better maintained where the paralysed muscles receive regular galvanic stimulation. At first sight the differences in volume seem disappointingly small, but they are very striking to the naked eye and are great in relation to the volume of the muscles alone. It has not yet been possible to establish the relation between the volume of the musculature of the hand and that of the hand as a whole, but it is tolerably certain that the muscles constitute less than one-quarter of the total volume of the hand. Thus it is safe to multiply the observed differences by four—perhaps five or six.

From these experiments it was clear that the general course of wasting is similar to that seen in experimental animals. The beneficial effect of galvanism is most noticeable soon rather than late after denervation, so the earlier treatment is started the better. However, galvanism does little if anything towards increasing muscle volume—at best it prevents the otherwise inevitable decrease—so that whatever has been lost through delay cannot be regained. During the first 100 days galvanism does not prevent wasting, it only retards it; and, although the results in the 0–100 days group are not so reliable statistically as in the other groups, detailed study of the few very early cases bore out the conclusion of Gutmann and Guttmann that the wasting that occurred soon after denervation could not be entirely prevented. At the same time it must be remembered that without galvanism wasting proceeds faster in the first 100 days than at any other time. The lesson to be drawn from this is that it is never too soon to begin galvanic stimulation, and if the paralysed part has to be enclosed in plaster windows should be cut so as to permit the early application of electrodes to the affected muscles.



Although it was not possible to formulate any general conclusion, the observation of individual cases strongly suggested that recovery was better in cases treated with galvanism than in those in which no attempt was made to check muscle-wasting. Furthermore, electromyographic observations showed that the delay between the appearance of motor units in a paralysed muscle and the first flicker of voluntary contraction was less in cases in which regular galvanic stimulation had been carried out. Recordings were also made in cases treated three times a week—most of them at other hospitals, where it may be assumed there were considerable variations in technique. The results were intermediate between those found in cases treated six times a week and those receiving no treatment at all.

While it is comforting to know at last that galvanism is of real value, it is indeed unfortunate that success depends so largely on the frequency of treatment. However, it is possible to train patients in the use of a galvanic machine, and if suitable apparatus can be manufactured at a reasonable price intelligent and co-operative patients might be encouraged to treat themselves at home. In a few cases this has already been done with success.

Another important problem awaits solution. In this investigation ulnar paralysis was chosen because of the ease with which the volume of the hand may be measured. But one cannot overlook the fact that the muscles of the hand are more accessible to stimulation than the much larger muscles of forearm, arm, leg, and thigh. When large masses of muscle are stimulated with tolerable currents the contractions observed are often confined to the more superficial fibres; thus it may well be that here the influence of galvanism on wasting is less striking than in the intrinsic muscles of the hand. This point is now being investigated in cases of radial paralysis, with the help of a larger and more elaborate machine capable of measuring the volume of the hand and forearm.

Summary

It has been proved experimentally that the wasting of denervated muscle—a process prejudicial to recovery—can be prevented to a considerable extent by regular electrical stimulation of the muscle with stimuli of long duration, such as are provided by a galvanic battery.

A fluid-displacement method was used to measure the volumetric changes in the hand in cases of ulnar paralysis, some treated with, others without, galvanism.

It was found that the application of 90 stimuli daily for six days a week was almost wholly effective in preventing wasting except during the weeks immediately following denervation, though even during this period such treatment reduced the rate of wasting. The stimuli were strong enough to produce a brisk contraction, and were given at the rate of 30 a minute, with an interval of one minute between each group of stimuli to permit recovery from any possible fatigue.

There was no evidence that electrical stimulation increased muscle volume, and hence it is important to start treatment as soon as possible, since whatever has been lost through delay cannot be regained.

There is no doubt that in ulnar paralysis daily galvanic stimulation is well worth while, and that the treatment should be continued until voluntary power returns.

It is not yet known whether galvanism is equally effective in preventing wasting in large masses of muscle, since a tolerable stimulus does not affect all parts of a large muscle mass equally, the deep fibres tending to escape altogether.

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CHANGES IN HUMAN VOLUNTARY MUSCLE IN DENERVATION AND RE-INNERVATION

BY

R. E. M. BOWDEN, M.B., B.S.

(Peripheral Nerve Injury Unit, Department of Orthopaedic Surgery, Oxford)

A study of the changes in human voluntary muscle during denervation and re-innervation is essential for a proper understanding of lower motor neurone lesions, especially peripheral nerve injuries. There are significant changes in structure and physiological properties. The subject will be considered from the point of view of histology, electrical reactions, electromyography, and treatment of paralysed muscles.

Structural Changes

For the sake of clarity some of the characteristics of a normal muscle must be mentioned first. A voluntary muscle is composed of numerous fasciculi made up of cross-striated fibres arranged in compact parallel bundles. The nuclei are for the most part arranged at the periphery of the fibres. Some preparations show minute granules regularly spaced at the level of the dark bands. The nerve fibres can be clearly seen, and the axons are myelinated to the point where they enter the motor end-plates. A single nerve-cell, its axon, and the muscle fibres innervated by it constitute the motor unit. The branching of the axon occurs close to the point of entry into the muscle. The blood supply is plentiful, for the capillary network is rich. All these structures are supported in delicate and sparse connective tissues.

In the early stages (one to three months after denervation) there is a loosening of the compact arrangement of the fibres, an apparent numerical increase of the nuclei, and little change in the connective tissue. The blood vessels appear to be dilated, indicating stasis of the circulation. The nerve fibres undergo Wallerian degeneration, and when all the debris of the disintegrating fibres has been removed the empty Schwann tubes remain and can be traced to the empty motor end-plates.

From three months onwards there is a progressive shrinkage of the muscle fibres, cross-striation fades from the earliest days, and the granules become increasingly apparent and irregularly arranged. The vessel walls thicken and some are completely blocked. There is an increase of connective tissue, apparently beginning around the vessels and spreading throughout the muscle, invading and finally obliterating the terminal Schwann tubes and motor end-plates. As the muscle fibres atrophy they are replaced by fat and connective tissue. Ghosts of fibres, a few capillaries, and the larger nerve trunks may be seen surrounded by fibrous tissue, and finally the muscle may resemble tendon, or there may be a few scattered connective-tissue tubes containing granules—all that remains of the muscle fibre.

The time course of these changes is of great importance, for upon the reversibility of the changes in the muscle fibres depends the recovery of function. The changes are predominantly those of atrophy and not degeneration. Fibrous tissue seems to wage a war of attrition upon muscle fibres. Up to one year after denervation it is possible to expect a fairly good degree of functional recovery; from then onwards the prognosis deteriorates, and as a rule from three years onwards the prospects are exceedingly poor. The fibres are atrophic and have lost their characteristic structure; connective tissue is strangling and obliterating the contractile tissue, vessels and empty motor end-plates, and Schwann tubes. There are exceptions to this statement, for there are notable individual variations: sepsis, age, mobility of the limb, and physiotherapy influence the rapidity of the changes.

The nature of the lesion in the nerve influences the degree of functional recovery profoundly, as this determines the number and maturity of the axons which ultimately reach the end-organs. In axonotmesis (Seddon, 1942, 1943); Gutmann and Sanders, 1943) the supporting tissues of the nerve at the site of the lesion are intact, although the trauma has been sufficient to cause complete peripheral degeneration of the axons. There is minimal intraneural scarring, and regeneration of the fibres occurs spontaneously and without obstruction down the original pathways. The time of denervation depends almost entirely upon the level of the lesion above the muscles (Gutmann, Guttmann, Medawar, and Young, 1942; Seddon, Medawar, and Smith, 1943). The motor end-plate is intact, cross-striation is visible, and atrophy of the fibres is slight. Good powerful independent muscle action is restored in such cases and there is an apparent complete reversal of the atrophic changes in the muscle although the pattern of innervation is slightly abnormal. Where the nerve has been more seriously damaged there may be partial disruption of the Schwann tubes and scar formation. Here some nerve fibres will be obstructed and there will not be an even advance of regenerating axons. Some permanent weakness and atrophy may be expected and there may be impairment of independent action of the muscles.

In complete division of the nerve no recovery can take place without surgical intervention. There is inevitable delay in re-innervation: at the site of the suture scar tissue is present in varying degrees. Moreover, there is unavoidable confusion of the axons at the suture line; therefore regeneration cannot take place down the original Schwann tubes. Some axons from the central stump may never penetrate the scar, others may escape laterally, and those that reach the peripheral stump may enter abnormal channels. The number of nerve fibres reaching the end-organs is diminished. If the muscle has been denervated for some considerable time the finer Schwann tubes are blocked and the motor end-plates will have disappeared. The regenerating nerve fibres may escape from the Schwann tubes, and they run for long distances between and across the muscle fibres seeking to make new connexions; some fail completely, and are therefore wasted (Gutmann and Young, 1944; Bowden and Gutmann, 1944). The reversal of changes in muscle fibres is hampered by the time of denervation and by incomplete and sometimes incorrect re-innervation. Full power and independent action can never be restored. Where delay has been too great the muscle may be incapable of recovery and the best degree of re-innervation will be of no avail (Bowden and Gutmann, 1944).

Electrical Reactions

Associated with the structural changes there are certain important changes in the function of the denervated muscle. Loss of tone and voluntary and reflex action is immediate and there is a more gradual change in electrical excitability. Each tissue has a characteristic excitability. Some are quick tissues—that is, they respond to electrical stimuli of low intensity and short duration: nerve is an example of such a tissue. Others are slow—that is, they will respond to stimuli of short duration only if the intensity is great.

A normal muscle responds to percutaneous faradic stimulation at low intensities; this stimulus is of short duration. The muscle contracts because it is receiving impulses via the intramuscular nerve twigs. As the nerve degenerates its excitability decreases and is ultimately lost. At the same time the muscle is losing the power of responding to faradic stimulation. The muscle fibres themselves are being stimulated, and the faradic response either disappears or is obtained only with a high current; the galvanic response, however, is much more easily elicited and the contraction becomes sluggish. This quantitative and qualitative change was described by Erb (1876) as the reaction of degeneration (but, as we have seen, the early changes in the muscle fibres do not merit description as degenerative). The sluggishness of the galvanic response is possibly due to the stimulus being conducted by muscle fibres and not by nerve; the rate of conduction in muscle is slower and all the fibres cannot contract simultaneously. During denervation the threshold to galvanic stimuli rises with loss of contractile substance and may finally disappear altogether if atrophy is advanced. The failure to elicit a galvanic response in the absence of oedema indicates serious atrophic change in a muscle. During re-innervation there are changes in excitability as the nervous element reappears, but it is possible for there to be a good functional recovery while the electrical reactions are still abnormal. (Reports of a further clinical survey will be published in due course.)

Electromyography

There is another interesting alteration in electrical activity which is of great significance in diagnosis; but, unlike electrical reactions, it can be of considerable prognostic importance. The action currents of contracting muscles can be recorded—the electrocardiogram is a well-known example. By electromyography it is possible to record the action currents in a voluntary muscle.

For about 12 to 28 days after denervation there is no recordable electrical activity in human muscle on attempted movement or at rest. From 12 to 28 days after denervation fibrillation occurs: this is shown by rhythmic fine spikes totally unrelated to attempted voluntary contraction. The exposed surface of such a muscle if observed by reflected light will show numerous small scattered twitches. Fibrillation persists as long as any contractile denervated fibres remain, or until re-innervation is taking place, but in the early stages of re-innervation a muscle which has previously shown vigorous fibrillation becomes silent. Motor-unit action potentials may precede recovery of voluntary function by as much as three months, and an isolated observation of this sort is no guarantee that further re-innervation is going to occur.

The finding of both fibrillation and motor-unit action potentials indicates a partial or recovering degenerative lesion of the lower motor neurone (Weddell, Feinstein, and Pattle, 1943, 1944; Bowden, unpublished).

Treatment

We have seen that electrical reactions and electromyography may be of help in diagnosis and to some extent in prognosis. The histological findings have shown that in the muscle itself atrophy of the muscle fibres and connective-tissue proliferation are the enemies of recovery. Surgical repair, if necessary, should be undertaken as soon as possible. There is experimental and clinical evidence that atrophy of muscle can be retarded by activity induced by adequate electrotherapy. The contraction of the muscle is essential; therefore faradic stimulation of denervated muscle is useless and a waste of time. Denervated muscle responds to galvanism, and this is therefore one method of treatment.

In a series of rabbits both the left and right tibialis anterior were denervated for the same length of time. One side was treated daily with galvanism, the other was untreated; and there was considerable difference in the naked-eye appearance of the muscles. The histological picture was even more impressive: the diameter of the treated muscle fibres is much greater than that of the untreated side and the formation of fibrous tissue is minimal (Gutmann and Guttmann, 1942, 1944). This is a most convincing proof of the value of regular adequate electrotherapy. Can this experimental finding be applied clinically?

Dr. Shirley Jackson investigated the value of galvanism in a series of cases of ulnar nerve palsies (personal communications; work in press). Volumetric measurements were made at intervals. It was seen that atrophy is most rapid in the early stages of paralysis, and that electrotherapy does not wholly prevent atrophy; it can only retard the rate. At no time was there an increase in volume of the hand in the absence of re-innervation. Therefore it is essential that electrotherapy not only should be regular and adequate but should begin as soon as possible after injury.

Connective-tissue formation is retarded by physiotherapy, but it cannot be entirely prevented. The late sequel of connective-tissue formation is contracture of the paralysed muscle. Whilst contractures can and do form in active unopposed muscles, they may occur in paralysed muscles, either early or late in the course of denervation. They can be wholly prevented by daily movements throughout the whole range of the joints of the limb. Splinting of paralysed limbs is never done to obtain immobilization unless there is a fracture or an unhealed wound; the object is to prevent overstretching and to encourage activity by compensating for the paralysis, if this is possible.

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VALUE OF SUPPLEMENTS OF VITAMIN C IN PREVENTING LACTATIONAL MASTITIS

BY

A. A. FULTON, M.D., D.P.H.

Maternity and Infant Welfare Medical Officer, Corporation of Dundee

One theory put forward for the high incidence of lactational mastitis in an industrial Scottish town (Fulton, 1945) was that a deficiency—probably due to wartime restrictions—in some food factor, or factors, was a predisposing cause. Nixon (1941) has suggested that there is a relationship between dietary deficiencies and puerperal infections, and has cited as evidence the fact that during the last war mortality from puerperal fever in Germany was almost doubled as a result of the blockade. One of the most obvious of wartime food curtailments in this country is shortage of fresh fruits and vegetables, the chief source of vitamin C. Widdowson and Alington (1941), in studying middle-class diets, have shown that in 1935 fruit supplied ten times as much vitamin C as it did in 1941 and that the average vitamin C intake in 1935 was more than double what it was in 1941.

At the time when this experiment was begun (Dec., 1941) the following assumptions could reasonably be made.

(1) There was a high, if not an increased, incidence of mastitis.

(2) The incidence of mastitis appeared to be greater in the winter months (Moon and Gilbert, 1935).

(3) Some degree of vitamin C deficiency was common. Many writers had brought forward evidence to support this view (Harris and Ray, 1935; Abbasy *et al.*, 1935; Orr, 1936; Harris *et al.*, 1936; Portnoy and Wilkinson, 1938; Harris, 1940a; Youmans, 1941).

(4) Hypovitaminosis C was likely to have increased under wartime conditions. This has since been proved by Widdowson and Alington (1941), Harris (1942), Francis and Wormall (1942), and Widdowson and McCance (1942).

(5) Hypovitaminosis C is more likely to occur during pregnancy and lactation. There is evidence that vitamin C requirements are increased during these periods (Harris and Abbasy, 1937; Smith, 1939; Neuweiler, 1935).

(6) There is a seasonal fluctuation in the intake of vitamin C, as fresh fruits and vegetables are more plentiful in the summer and autumn months. Evidence of this has since been published by Harris (1942), McNee and Reid (1942), Harris and Olliver (1943), Prunty and Vass (1944), and Craig *et al.* (1944).

(7) The time of seasonal increase in the incidence of mastitis (the winter and spring months) roughly corresponds to the period when intakes of vitamin C are lowest.

(8) Lack of vitamin C diminishes the resistance to infection (Harris, 1937; Smith, 1939; Harris, 1940b; Youmans, 1941).

If these assumptions were accepted there seemed to be some justification for postulating that vitamin C deficiency might be responsible, at least in part, for the occurrence of mastitis. An experiment was devised to attempt to verify or disprove this hypothesis. Although, admittedly, a diet functions as a whole and deficiency of one constituent only is unlikely to occur, it was thought better to investigate the effects of varying the intake of one single factor in order to attempt to obtain a clear-cut result regarding that factor. The project was to give one group of pregnant women supplements of ascorbic acid and to compare them, especially as regards the incidence of mastitis, with a group of women, similar in other respects, who did not receive supplements.

Plan of the Experiment

There are two ante-natal clinics in the town concerned, each serving approximately half the town and attended by patients similar in most respects, including social status. The expectant mothers attending one of the clinics (Clinic A), who had booked to be delivered in the Maternity Hospital, were given a daily supplement of ascorbic acid from the sixth month of pregnancy until the end of the sixth month after delivery—i.e., over a period of nine months covering the later months of pregnancy and almost the whole period of lactation. The supplements consisted of 50-mg. tablets of ascorbic acid, and the patient was requested to take one tablet a day for the nine-months period. The tablets were given out at the ante-natal clinic, and supplies were renewed at subsequent visits, in the Maternity Hospital, at the child welfare clinics, or delivered at the home. The dosage chosen was based on a daily requirement of 30 mg. for an adult as recommended by the Technical Commission on Nutrition (1938), but some surplus (20 mg.) was allowed owing to the increased demands of pregnancy and lactation. The total daily intake was probably in the region of 70 mg., as these women were presumably consuming some vitamin C in their ordinary diet—probably not less than 15 to 20 mg. a day—and the 50-mg. tablet was considered to be in the nature of a supplement to bring what might be an inadequate intake up to a satisfactory level. Graham and Cameron (quoted in the Departmental Report on Infant Mortality in Scotland, 1943) found that in Glasgow the average values of vitamin C in the diets of 300 pregnant women varied from 30 to 42 mg. a day.

The great disadvantage in dealing with out-patients is that it is impossible to be sure that the tablets are actually ingested. Most experiments of this nature have been carried out in hospitals, schools, and other institutions, where the subjects are under direct control and supervision, and where supplements can be added to the diet. In this experiment the difficulty could not be overcome in any way, but tests were carried out on every patient while in the Maternity Hospital to estimate the degree of saturation, and this was very helpful in assessing the previous regularity of ascorbic acid consumption.

The group of patients attending Clinic A, who received supplements of ascorbic acid, will be referred to as Group A, and consisted of 124 women. The patients attending Clinic B did not receive any supplement, and acted as controls; they numbered 126, and will be referred to as Group B. Comparisons between the two groups as regards age, parity, and income levels were made. The average age of Group A patients was 27.30 years, which was very much the same as the average for Group B—namely, 27.62. The average weekly income per household was slightly higher for the Group B patients, being 75s. 10d., as compared with 68s. 9d. for Group A. There was a greater proportion of primiparae in Group B (52.4%) than in Group A (47.6%).

On admission to the Maternity Hospital, where Group A patients continued to have a daily dose of 50 mg. of ascorbic acid, all patients in both groups were examined and particulars taken as to previous diet, with special reference to the consumption of fruit and vegetables, weekly incomes, and number of members in the household. In the case of Group A inquiries were made as to the regularity of the tablet consumption. The vitamin C nutrition of both groups was assessed by means of the saturation test devised by Harris and Abbasy (1937).

In the early part of 1943 the Maternity Hospital had to be closed owing to an outbreak of puerperal infection and, for this and other reasons, 15 women in Group A were delivered at home instead of in the hospital, as had been originally intended. Supplies of ascorbic acid tablets to these women were continued, but it was not possible to carry out saturation tests. As the Group B patients were only "enrolled" on admission to hospital all in this group were tested.

It was found that a fair number in Group A were not saturated for several days, which suggested either that the tablets had not been taken regularly or that the demands were greater than the amount of vitamin supplied.

It is considered by Harris (1943) that subjects who saturate on the second day of test-dosing have a satisfactory intake as judged by the League of Nations standard, and that with daily intakes of 50 to 75 mg. saturation will occur on the first day. On the other hand, when intakes are appreciably below the League of Nations standard, three days or more are required for saturation.

According to this standard, only one-half (50.5%) of the 109 women in Group A who were tested could be considered to have had an adequate intake prior to testing. This state of saturation of the women in Group A was judged to be not entirely satisfactory, but the degree of saturation in Group A was much better than in Group B, in which only 10 women (7.9%) were saturated by the second day. It may also be noted that, whereas 20 (18%) of Group A were unsaturated by the end of the fourth day, 87 (70%) in Group B took more than four days to reach saturation level.

The average amount of ascorbic acid required for saturation was 1,673 mg. for Group A—just a little more than half of the 3,076 mg. required for Group B. These figures may be compared with the average number of milligrammes of ascorbic acid required to saturate members of the staffs (nursing and medical) of two municipal hospitals (1,165 mg. for the staff of one hospital and 1,421 mg. for the staff of the other).

TABLE I.—*Number of Days of Test-dosing required to Attain Saturation*

Days	Group A	Group B
1	31 } 55 (50·5%)	3 } 10 (7·9%)
2	24 }	7 }
3	21	19
4	13	10
5	12 } 54 (49·5%)	32
6	6	24
7	2	22
8	—	6 } 116 (92·1%)
9	—	2
10	—	—
11	—	—
12	—	—
13	—	*1 }
Total ..	109	126

* This patient showed no evidence of scurvy. The gums were healthy, but she was completely edentulous.

It would appear from the results of the saturation tests that pregnant women require supplements of vitamin C to bring the intake up to a satisfactory level; but Harris (1943) is careful to point out that saturation is not necessarily desirable and that "substandard" is not synonymous with "clinically deficient." Although many members of both groups were found to be deficient in vitamin C there was a big enough difference in the saturation levels of the two groups to allow some comparisons to be made.

Effect of Vitamin C Administration on Incidence of Mastitis

The incidence of suppurative mastitis in both groups was very high, and more than double the rate found by a notification scheme elsewhere described (Fulton, 1945). It must be remembered, however, that these patients were very carefully observed and followed up for a period extending to the end of the first six months after delivery, whereas under the notification system referred to cases may have been missed. It was impossible to complete the follow-up of five patients (four in Group A and one in Group B) who left the district before the six-months period had expired and could not be traced, and two in Group B who died. Consideration must also be given to the fact that the great majority (all but the 15 in Group A who were delivered at home) were hospital patients, and most authorities agree that patients delivered in hospital are much more prone to develop mastitis.

Table II shows that the incidence of mastitis, including cases which resolved without abscess formation, was almost equal (30% in Group A and 30.9% in Group B), but there was a slightly greater percentage of suppurative mastitis in Group A (26.7%, as compared with 23.6% in Group B). It would not have been surprising if these figures had been reversed, as Group A was more favourably situated as regards two factors considered to be predisposing causes—viz., primiparity and delivery in hospital.

TABLE II.—*Incidence of Mastitis in the Two Groups*

	Group A	Group B	Total
Mastitis (suppurative) ..	32 (26·7%)	29 (23·6%)	61 (25·1%)
,, (non-suppurative) ..	4 (3·3%)	9 (7·3%)	13 (5·3%)
No mastitis	84 (70·0%)	85 (69·1%)	169 (69·5%)
Untraced	4	3	7
Total	124	126	250
Primiparae	59 (47·6%)	66 (52·4%)	
Number confined in hospital	109 (88·0%)	126 (100·0%)	

From these results it would appear that vitamin C administration *per se* has no influence in reducing the incidence of mastitis, and this is borne out when the available information is analysed more fully.

The number of patients with mastitis in whom the state of vitamin C nutrition was estimated by means of the saturation test was 69—57 with abscess formation and 12 in whom the condition subsided.

Mastitis Cases tested by Saturation

It can be seen from Table III that the average amount of ascorbic acid required to saturate the patients with suppurative mastitis was 1,221 mg. in Group A and 3,167 mg. in Group B; the comparable figures for non-suppurative mastitis were 1,600 mg. for Group A and

3,067 mg. for Group B. These may be compared with the average amounts required to saturate all the members of each group.

Table III.—*Average Amount of Ascorbic Acid in milligrammes required for Mastitis Cases to Attain Saturation*

	Suppurative Mastitis	Non-suppurative Mastitis	Average for Whole Group
Group A ..	1,221 (28 cases)	1,600 (3 cases)	1,673 (109 cases)
Group B ..	3,167 (29 ,,)	3,067 (9 ,,)	3,076 (126 ,,)
Both groups ..	2,210 (57 ,,)	2,700 (12 ,,)	2,425 (235 ,,)

As regards the time required to attain saturation of the patients who developed mastitis, 17 (29.8%) of the suppurative cases (all in Group A) and 3 (25%) of the non-suppurative cases (two in Group A and one in Group B) were saturated by the end of the second day —i.e., they could be considered to have a satisfactory intake according to the League of Nations standard. Therefore the attainment of a satisfactory level of saturation by itself did not prevent mastitis in one-quarter of the cases (Table IV).

Table IV.—*Number of Days of Test-dosing required to Attain Saturation of Mastitis Cases*

Days	Group A	Group B	Total
	(*a*) Suppurative Mastitis		
1	13 } 60·7%	0 } 0%	13 } 29·8%
2	4	0	4
3	9	6	15
4	1	2	3
5	1 } 39·3%	7 } 100%	8 } 70·2%
6	0	6	6
7	0	7	7
8	0	1	1
	28	29	57
	(*b*) Non-suppurative Mastitis		
1	0 } 66·7%	0 } 11·1%	0 } 25%
2	2	1	3
3	0	0	0
4	1	1	2
5	0 } 33·3%	4 } 88·9%	4 } 75%
6	0	1	1
7	0	2	2
8	0	0	0
	3	9	12

The incidence of suppurative mastitis in 62 patients of both groups who had reached a satisfactory level of saturation by giving a response before the third day was 27.4% (Table V).

From the results of the experiment it would appear that supplements of vitamin C, or a level of saturation denoting a satisfactory intake of this vitamin, had no beneficial effect on the incidence of mastitis.

Table V.—*Incidence of Mastitis in Patients who Reached the "Satisfactory" Standard—i.e., Response Before the Third Day*

	Group A	Group B	Total
1st and 2nd day responses ..	55	10	62
Suppurative mastitis	17	—	17 (27·4%)
Non-suppurative mastitis ..	2	1	3 (4·8%)
No mastitis	33	9	42 (67·7%)
Untraced	3	—	3
Total	55	10	65

Discussion

The results of this experiment would seem to indicate that a deficiency of vitamin C is not the factor concerned in the high incidence of mastitis. There is no doubt that a large number of the women, when admitted to the maternity hospital, showed marked deficiency as judged by saturation tests, but they did not seem to be more susceptible to mammary infections than did those showing no deficiency. It was possible to carry out the saturation tests only when the women were in hospital, and these tests were done with two objects in view; (1) to assess the degree of saturation of the women receiving supplements, in order to get some indication of the regularity of ingestion of the tablets; (2) to estimate the degree of saturation of the ordinary hospital patient who had had no vitamin C apart from what was obtained in the ordinary diet.

It is not claimed that one testing during the period under consideration would necessarily indicate the general saturation level for the whole period; the state of vitamin C nutrition may have varied—some women improving their intake after delivery, and vice versa. However, as the normal individual tends to be conservative in the matter of diet the tests probably gave a broad indication of the vitamin C nutrition of the subjects concerned. Apart from the difficulty of carrying out tests except under hospital conditions, it must be remembered that the controls—Group B, who had no supplements—entered the lactation period in a "saturated" condition as a result of the test-dosing. This was unavoidable, and it was assumed that these women would not materially change their dietary habits and would therefore soon revert to their former state of low vitamin C intake. In this connexion it is of interest to note that, in an endeavour to find out the duration of the state of "saturation" following test-dosing, some members of the hospital staff were tested at intervals of three weeks. Although, when considered over a long period, some seasonal fluctuation was noted, there was very little change from one testing to the next—e.g., a subject who in mid-December required three days of test-dosing to attain saturation required as many days in the beginning of January. It was thus reasonable to assume that the effects of saturation from test-dosing did not last longer than about three weeks.

If, however, it had been feasible to make more frequent tests and these had been carried out, the use of Group B as controls would then have given rise to a possible fallacy, in so far as these subjects could no longer have been considered to be having no supplements. As it was, the effect on the results of the experiment of Group B women entering the lactation period in a state of saturation is not likely to have been important, since the state of "saturation" following test-dosing does not appear to be of long duration. Moreover, the experiment was designed as an attempt to assess the possible part played by the administration of *supplements* of vitamin C, and Group A women, who were also saturated on the completion of the test-dosing, continued to have extra vitamin C in the form of a daily tablet containing 50 mg. of ascorbic acid. It can be argued that if vitamin C does increase resistance to infection, only in the event of the women in both groups already having such optimum intakes that they were in a state of full "saturation" and their vitamin C nutrition incapable of further improvement could additional supplies have been expected to yield no result. As test-dosing showed that this was far from being the case, Group A subjects, who had additional supplies of ascorbic acid, should have shown a lessened incidence of infection, which was not borne out by the results of the experiment.

It is apparent from the results of the saturation tests that many members of both groups, consisting of pregnant women of the type normally delivered in a maternity hospital, were deficient in vitamin C, and many, if testing had not been carried out, would normally have entered the lactational period with a gross deficiency. Judging by the average amount of ascorbic acid required to attain saturation, women in Group B showed a high degree of deficiency, while those in Group A, even with a daily supplement of 50 mg. of ascorbic acid, barely attained the level reached by institutional staffs on an ordinary diet without any supplement. Two factors may have been responsible for this deficiency: (1) greater utilization of the vitamin, due to the increased demands of pregnancy; (2) low intakes due to poverty, ignorance, or faulty methods of preparation and cooking of food.

Although many members of Group A showed some deficiency, it would be unfair to suggest that the daily supplement of ascorbic acid was necessarily insufficient, as there was no guarantee that all the women in this group actually ingested the supplements, and any defaulters in this respect would raise the apparent level of deficiency for the whole group.

In considering these negative results it must be remembered that the experiment was concerned with the intake of a single food factor. Proof of a possible relationship between mastitis and deficiency of any single dietary constituent may be difficult to obtain on account of the almost inevitable coexistence of other deficiencies. If a deficiency of one factor is present the simultaneous existence of other deficiencies is extremely likely. To increase the supply of one deficient factor without at the same time increasing the supply of the others may not be sufficient to affect the health and resistance of the subjects concerned. It is also to be remembered that the supplement

used was a synthetic product, and the maximum benefit of the protective substances may be obtained only when given in the form of natural foods.

Summary

When comparing two groups of women for a period extending from the later months of pregnancy until six months after delivery, one of the groups being supplied with supplements of ascorbic acid, it was found that there was a deficiency of vitamin C, as measured by saturation tests, in both groups; the deficiency was naturally greater in the group without the supplements.

The incidence of suppurative mastitis in both groups taken as a whole was very high. When approximately 250 expectant mothers were followed up over a period of six months following delivery it was found that 25% suffered from breast abscess. It is to be noted that, with few exceptions, these patients were delivered in hospital.

There was no reduction in the incidence of mastitis in the group receiving the supplements or in those who gave evidence of a satisfactory intake as judged by saturation tests.

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ACUTE IDIOPATHIC PORPHYRIA

BY

G. DISCOMBE, M.B., B.S., B.Sc.
Senior Demonstrator of Pathology

AND

JOHN L. D'SILVA, D.Sc., M.R.C.P.
Lately Chief Assistant

St. Bartholomew's Hospital

In the porphyrias uroporphyrins are excreted in the urine, in contrast with coproporphyrinuria, which occurs in many diseases. The porphyrias have been reviewed in detail by Mason *et al.* (1933), Waldenström (1937), Chandler *et al.* (1939), Roger *et al.* (1939), Dobriner and Rhoads (1940), and Nesbitt (1944).

Waldenström (1937) has described five types of acute porphyria: (*a*) Latent porphyria—an asymptomatic form in which uroporphyrin is excreted continuously or intermittently, for years, in the urine. (*b*) Abdominal type—onset sudden, with colic, vomiting, obstinate constipation, and tympanites. (*c*) Nervous type—onset sudden, with pareses of the extremities, convulsions, confusional states, coma, or bulbar paralysis. (*d*) "Classic type"—both abdominal and nervous symptoms. (*e*) Comatose type—abdominal colic, rapid onset of coma, and death.

In all types tachycardia and hypertension occur during the acute attack. In nearly all cases the urine contains uroporphyrin-III, with but traces of the series-I isomer; occasionally the latter predominates (Turner, 1938; Golden, 1943). Sometimes acute porphyria occurs during the prolonged administration of trional, tetronal, or sulphonal, and these have been regarded as "toxic" porphyrias (Mason *et al.*, 1933; Nesbitt and Watkins, 1942), but Waldenström considers that the division between toxic and idiopathic groups is very questionable.

The diagnosis is established by the demonstration of porphyrin in the urine. In some cases the freshly voided urine is normal in colour and contains porphobilinogen (Vahlquist, 1939), which changes to porphyrin on standing or heating. The presence of porphobilinogen is recognized by Watson and Schwartz's test (1941). The reddish-brown colour of the urine which contains porphyrin is due to the formation of coloured substances such as urofuscin, urorosein, and indirubin from colourless chromogens (cf. Turner, 1938; Watson, 1939).

The porphyrin may be present as a zinc complex (Turner, 1938; Chandler *et al.*, 1939; Nesbitt and Watkins, 1942) which has absorption bands indistinguishable in position, if a hand spectroscope only is used, from those of oxyhaemoglobin—differing, however, in that the β band is more intense than the α band, whereas in oxyhaemoglobin the reverse is true.

A few cases have been reported (Backer-Gröndahl, 1935; Schie, 1939) in which the symptoms closely resembled those of the "abdominal type" of the disease but the dark-coloured urine contained no detectable traces of porphyrin. Waldenström (1939) described a similar case, but during a remission of the disease the patient excreted pathological amounts of porphyrin.

The case described below is put on record for three reasons: (*a*) it was under continuous observation for two years, during which four exacerbations of the disease occurred; (*b*) in one of these the porphyrin output was followed quantitatively from day to day; and (*c*) in several relapses the clinical picture varied.

Case History

The patient, a sheet-metal worker aged 19, was admitted to St. Bart's for investigation on April 4, 1942. He was quite well until June, 1941, when he had a fairly sudden onset of dull aching pain round and below the umbilicus. This soon became colicky in nature and severe, but the pain did not radiate. Attacks lasted for two or three hours and had no relation to food or exercise. Nausea, vomiting, and obstinate constipation were prominent features of the illness. Some two weeks later he had five "fits" in one morning and was admitted to a hospital with a *Bact. coli* infection of the urine and a B.P. 150/110 but no other abnormal signs. The urine was free from lead, and the C.S.F. and a radiograph after a barium enema were normal. The urinary infection cleared satisfactorily, the B.P. returned to normal, and he was discharged in three weeks.

Second Attack.—In Jan., 1942, he was readmitted to hospital with symptoms similar to those in the first attack. The urine was reported as normal, but the colicky pains persisted for a few days. B.P. 160/100. He was discharged within three weeks.

Third Attack.—On March 28, 1942, he complained of aching in the limbs followed by colicky abdominal pain, vomiting on one occasion, and obstinate constipation. On April 4 he was admitted to this hospital for investigation, when, in addition to the above history, he reported having lost a considerable amount of weight during the past six months. On examination the fauces were injected, there was slight tachycardia (pulse 90), and the B.P. was 160/120. There was slight tenderness in the abdomen below the umbilicus and the liver margin was just palpable. The urine was dark brown in colour, of sp. gr. 1032, without protein, ketone bodies, or blood. It reduced Benedict's reagent, and Schlesinger's test for urobilinogen was strongly positive. Examination of the fresh urine with the direct-vision spectroscope showed no abnormal absorption bands, but on standing for some hours it darkened and the two-banded spectrum of porphyrin became visible in a half-inch layer. An amyl alcoholic extract of the fresh or of the stale urine showed the α, β, and γ bands of alkaline porphyrin, converted by hydrochloric acid to acid porphyrin. Toluene-soluble red pigments were also present.

Investigations.—Hb, 118%; R.B.C., 5.5 millions; W.B.C., 6,800, with a normal differential count. There was no punctate basophilia. E.S.R., 1 mm. in the first hour. Serum bilirubin was normal. Blood W.R. and Kahn tests were negative. The reducing substance in the urine was proved to be glucose. A glucose-tolerance curve gave the following result (blood sugar in mg. per 100 c.cm. followed by time in hours, in parenthesis, after the test dose of glucose): 88 (0); 148 (1/2); 140 (1); 125 (1½); 115 (2). Urine specimens before the test dose and two hours afterwards contained sugar, which indicates a low renal threshold for glucose. Radiographs of the lungs, abdomen, and kidneys were normal. The skull was normal except for a small pituitary fossa (transverse, 8 mm.; vertical, 3 mm.; and interclinoid measurement, 1 mm.).

Course of the Illness

Nausea and constipation were marked, but abdominal pain did not amount to more than discomfort below the umbilicus. The

patient lost weight very rapidly, as shown by Fig. 1; and on April 28 (fourth week after admission) he had an epileptiform attack associated with cyanosis and widespread clonic movements but no incontinence. B.P. remained about 150/110, and tachycardia persisted. By the sixth week increasing weakness of the large muscle groups of his arms and legs was apparent, and there was fibrillary twitching in the deltoid and pectoral muscles. Reflexes were absent

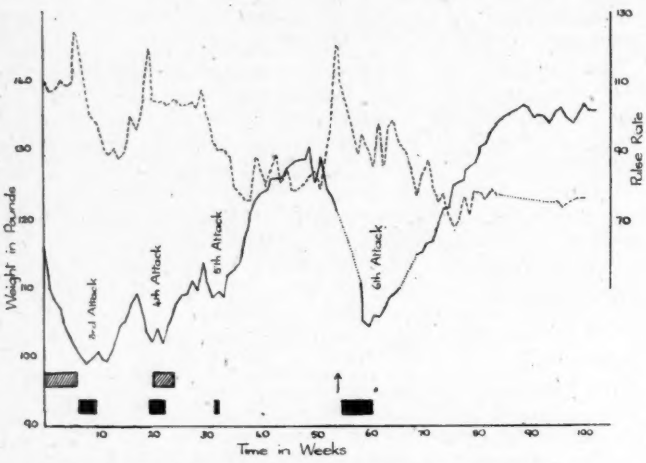

Fig. 1.—Weekly variations in the patient's weight: ——. Average weekly pulse rate: - - - - -. No observations made: . . . . . Black rectangles: Duration of abdominal symptoms. Shaded rectangles: Time during which barbiturates were given. The arrow: Sulphathiazole given.

in both arms, and pain sensation was blunted on the trunk and face. Within two weeks he became so weak as to be unable to move his hands or arms, and his voice was very hoarse and feeble. There was gross wasting of all muscle groups in the arms, forearms, and hands; fibrillary twitching had ceased. He had difficulty in standing because of weakness of the legs. Knee- and ankle-jerks were present and equal, with the plantar responses Babinski-negative. He sustained a burn from a hot-water bottle on his leg, and it was found that sensitivity to pinprick was impaired in both legs (it had been normal a week earlier), but position sense was normal. For a period of six weeks he was unable to feed himself. By the tenth week his voice was stronger, his weight was increasing, and there was some return of power to the flexor muscles of the arms. Six weeks later there was still gross wasting of the pectorals and deltoids, biceps and triceps groups, forearm muscles, especially the ulnar group, and of the intrinsic muscles of the hands. The arms could not be abducted. Full flexion and extension of the elbows were possible, but without power. There was bilateral wrist-drop. Touch, vibration, and position sense were normal, but there was blunting of pinprick sensation, especially on the hands, and the tendon reflexes were absent. Abdominal reflexes were absent. The muscles of the legs were of good tone and there was no wasting. All leg movements were weak but incomparably stronger than those of the arms. Tendon reflexes were normal.

Fourth Attack.—From the 20th to 22nd weeks he complained of much abdominal pain and was constipated. His weight decreased considerably (Fig. 1), but there was no extension of paralysis. By the 30th week his legs were normal, but his arms were still grossly wasted and weak, without tendon reflexes yet with enough power slightly to abduct the arms and dorsiflex the wrists. Sensation in the arms was normal, but there were no abdominal reflexes. Within two weeks marked improvement was apparent. The arms could be moved relatively easily and all the tendon and abdominal reflexes had returned.

Fifth Attack.—During the 32nd week he again complained of slight abdominal pain and constipation and, though this was associated with loss of weight, there was no extension of paralysis. From this time there was gradual but continued recovery of muscular power and the wasted muscles regained their normal contours. By the 52nd week the patient was able to help in the ward and could support the weight of a laden tray and perform fine movements with his fingers.

Sixth Attack.—On April 16, 1943 (54th week), a small pustule appeared on the ring-finger of the right hand and lymphangitis developed next day. Sulphathiazole was started, but was discontinued after 9 g. had been given. On April 21 he vomited and experienced severe abdominal colic, and his limbs felt very heavy. He had been losing weight for four weeks. The only abnormal signs were tachycardia and a B.P. of 160/130. During the succeeding week he suffered from marked insomnia and was at times mentally confused. The power of his shoulder-girdle muscles diminished rapidly and in 10 days he was practically unable to move his arms. Simultaneously, the muscles wasted rapidly and there was a further marked loss of weight. The distribution of the weakness and wasting was as in the third attack, but in addition he had tenderness of both quadriceps and knee-jerks were absent. At this time there was no hepatic involvement as judged by the bromsulphthalein dye excretion test. The legs soon recovered their normal power, but even after three months—long after the abdominal and mental symptoms had disappeared—there was gross weakness and wasting of both arms (the right more than the left), abduction being very poor. By the 73rd week movements of the large joints of the arms were good and reasonably strong. The dorsal interossei of the hands, especially the first, were still very weak and wasted, and the power of the lumbricals was poor. Eighty-seven weeks after admission the small muscles of the hands had recovered to a considerable extent—enough to enable him to weave. Improvement continued until his discharge on April 8, 1944, when his weight was steady. He was then working at occupational therapy for several hours a day and could write without difficulty. His urine still contained considerable amounts of porphyrin and of urobilin.

Five months after his discharge the patient was working as a clerk for six hours a day; weight 138 lb., pulse 72, B.P. 124/72. His urine contained a great deal of porphobilinogen and urobilinogen, and yielded much porphyrin and moderate amounts of the associated red pigments on standing. At this time a single specimen of the urine of each of his parents was examined, but neither contained porphyrin.

Comment

Fig. 1 records the patient's weight and pulse rate throughout his stay in hospital—that is, from soon after the start of his third illness until his discharge. The gross loss of weight which preceded each relapse is well shown, as was the recovery of weight when the symptoms subsided. The fourth and fifth attacks, which were minor episodes clinically, were also associated with a definite fall in weight. The greater loss of weight associated with the sixth attack was in keeping with the fact that it was comparable in severity with the third illness. Each point on the pulse-rate curve represents the average reading for the week. Tachycardia was a marked feature of the condition, with peaks in the curve of pulse rate corresponding to each relapse. The black rectangles indicate the duration of abdominal symptoms—namely, pain alone, or with vomiting and nausea. The shaded rectangles denote the duration of administration of phenobarbitone. The arrow represents the point at which sulphathiazole was given.

Excretion of Porphyrins.—Prof. C. Rimington kindly investigated quantitatively the output of porphyrins in the urine by

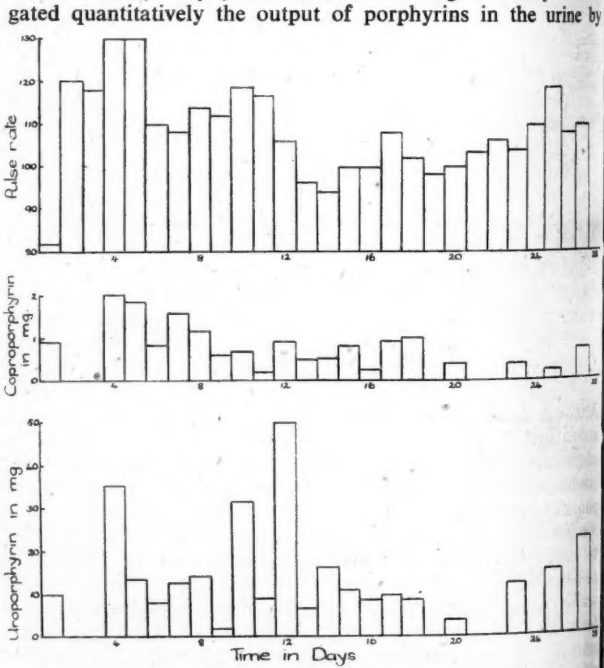

Fig. 2.—Lowest chart: Day-to-day excretion of uroporphyrin in mg. during the fourth attack (cf. Fig. 1). Middle chart: Corresponding excretions of coproporphyrin in the urine. Upper chart: Daily variations in pulse rate.

methods which he has published elsewhere (1943). He found that uroporphyrin-III predominated in the urine, the isolation of which as its octamethyl ester completed the clinical diag-

nosis. Coproporphyrin-III and a very small amount of coproporphyrin-I were also found. Fig. 2 represents the day-to-day excretion of uroporphyrin and of coproporphyrin from the 19th to the 23rd week after admission. The daily variations in pulse rate are also charted. An increase in porphyrin excretion was associated with a rise in pulse rate, though the correspondence was not exact.

Conclusion

The administration of sulphonamides or of barbiturates may precipitate an attack (Mason *et al.*, 1933; Waldenström, 1939; Nesbitt and Watkins, 1942). Phenobarbitone, 1 gr. twice daily, was given for periods of several weeks during the third and fourth attacks, but there was no evidence that the drug affected their course adversely. The onset of the sixth relapse cannot be attributed to the administration of sulphathiazole, as the patient had then been losing weight for about four weeks—a sign, in his case, of pending relapse. A noteworthy feature of the disease is the degree of restoration of function of the paralysed muscles, which in this patient appeared nearly complete.

Summary

A patient complaining of attacks of abdominal pain, constipation, and fits was found to be excreting uroporphyrin-III in his urine and to be suffering from acute porphyria. A marked decrease in body weight preceded the onset of symptoms.

In the course of three years he experienced six relapses, in each of which the symptomatology varied. Recovery now appears to be complete although porphyrinuria persists.

In one attack the daily variation in porphyrin excretion was determined.

The clinical features of the disease and methods by which the diagnosis may be confirmed in the laboratory are described.

We wish to thank Dr. Geoffrey Evans for permission to publish this case.

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SIMMONDS'S DISEASE DUE TO POST-PARTUM NECROSIS OF THE ANTERIOR PITUITARY: CARCINOMA OF STOMACH

BY

R. T. COOKE, M.D.

Assistant Pathologist, Preston Royal Infirmary

Although the papers by Sheehan (1938, 1939, 1940) and Sheehan and Murdoch (1938, 1939) have clarified knowledge as to the causation of Simmonds's disease and stimulated interest in this condition, descriptions of cases due to necrosis of the anterior pituitary lobe resulting from post-partum collapse are still rarely seen in the clinical journals. The following case may therefore be of interest. It is reported alone, although other presumptive cases have been seen in this department during the past few years, including that of a woman who had amenorrhoea dating from the birth of her last child when she was 30, and who died, aged 39, of carcinoma of the bladder, with an extensive neoplastic spread in the pelvis. Post-mortem examination revealed splanchnomicria and (both to the naked eye and in serial sections) the typical atrophy in the anterior pituitary. Owing to her general condition, however, few investigations had been done during life.

Case Report

Mrs. W., aged 59, was referred for investigation on Feb. 23, 1943, by Dr. F. M. Rose, of Preston. She gave a history of progressive tiredness and loss of 1 st. in weight over the past year, and anorexia and numbness of the fingers since an attack of influenza in 1942. She had mentioned epigastric pain to her doctor, but told me that there had been no pain, vomiting, epistaxis, or dysphagia. She had had four pregnancies; her son was aged 37, the middle two children had died at 11 months and 2 years old, and her daughter was 27. The first three confinements were uncomplicated, but at the birth of the last child, when the patient was 32, there was severe haemorrhage and she was in bed seven weeks or more from weakness. She menstruated 5 months later, and again, for the last time, four months after that. After the delivery she did not lactate, and the breasts, from being large, became very small. Loss of hair was soon noticed (especially axillary and pubic), and she gained 1½ st. in weight. A year passed before she regained her strength. Sensitivity to cold developed, becoming more pronounced during the last year. No change in sex feelings could be recalled. The patient's daughter-in-law said that she had been pale for 15 years or more, but the pallor had become more grey over the past year, and the cheeks were sunken. No psychological changes had been noted, such as peevishness, unkindness, absentmindedness, faints, fugues, or attacks of coma.

Examination.—Height, 5 ft. 1 in.; weight, 6 st. 11 lb. The pallor and wasting gave the clinical picture of cachexia; face wrinkled, cheeks sunken, no glossitis; axillary and pubic hair absent; scalp hair thin; eyebrows very thin; breasts flat and atrophic; soft quick pulse, with occasional dropped beats (B.P. 100/60); oedema of lower legs; nothing abnormal felt in abdomen. Physical examination otherwise negative.

Blood Counts, 1943

	Hb Haldane	R.B.C. (mills.)	Anisocytosis	M.C.V. (c.μ)	Mean Diam.	Leucocytes	
						Total	Neut.
Feb. 23	100	4·4	Slight	86	7·7μ	6,400	2,900
Mar. 17	95	4·2	,,	—	—	8,400	4,500
April 2	74	3·7	,,	—	7·8μ	—	—

Blood Chemistry

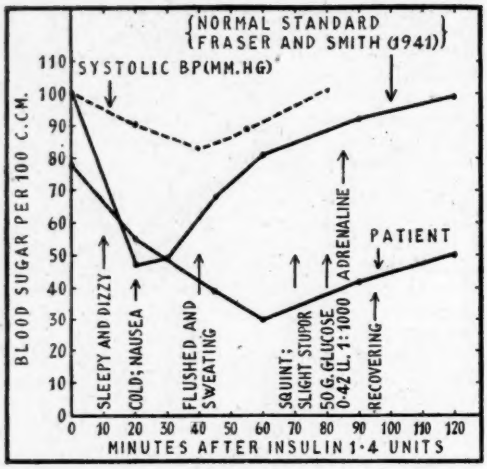
	Feb. 23	Mar. 12	Normals
Bilirubin (mg./100 c.cm.) ..	0·7	—	—
Calcium ,, ..	—	8·5	9– 11
Chlorides ,, ..	568	570	560–620
Cholesterol ,, ..	125	132	120–230
Phosphate ,, ..	—	4·2	3– 4·5
Phosphatase ,, ..	—	15	3– 13
Potassium ,, ..	25	24	18– 21
Protein (g./100 c.cm.)	—	7·1	6– 8
Sugar (true) fasting (mg./100 c.cm.)	65	—	65–100
Glucose-tolerance test (50 g.) ..	80–150–70	—	—
Urea (mg./100 c.cm.)	25	—	—
Sodium ,, ...	297	—	300–325

Progress.—Feb. 23: Urine normal. Feb. 25: B.M.R., –9%. Fractional test meal: Histamine-fast achlorhydria without evidence of stagnation or organic lesion. March 9: Glucose-tolerance test—normal curve; electrocardiograph, "T_2 inverted" (Dr. Harold Isaacson). March 12: B.M.R., –37%. March 24: Insulin sensitivity test (Fraser and Smith, 1941). As there were clinical grounds for suspecting pituitary insufficiency, one-third of the standard dose of insulin was used—i.e., 0.1 unit per 3 kg. of body weight. After 1.4 units of insulin had been given intravenously the blood sugar fell from fasting level of 78 mg. per 100 c.cm. to 38 mg. per 100 c.cm. in 45 minutes and 30 mg. per 100 c.cm. in 60 minutes. In the healthy subject symptoms of hypoglycaemia should not persist after this one-hour point. As the patient then showed slight clouding of consciousness and a slight squint, the test was cut short by 50 g. of glucose orally, and an intramuscular injection of 0.42 c.cm. of 1: 1000 adrenaline. The lowest figure for the systolic blood pressure was 82 mm. Hg 40 minutes after the insulin. She was admitted to hospital for a rest and was discharged two days later feeling no ill effects.

[The following explanation of the insulin sensitivity test is quoted from Fraser and Smith (1941): "The rate of the initial fall in the blood sugar differentiates normal or increased insulin sensitivity from insulin resistance; and the speed of the subsequent return to the fasting level will indicate any tendency to persistence of hypoglycaemia—that is, a delay in return will indicate 'hypoglycaemia unresponsiveness,' which may be found mainly in hyperinsulinism, hypo-adrenocortinism, or panhypopituitarism. Thus the characteristic result of this test in panhypopituitarism is a normal rate of fall associated with an abnormally slow return to the fasting level, or 'hypoglycaemia unresponsiveness'."]

The accompanying Graph shows the slow and prolonged fall of the patient's blood sugar and the typical delayed rise. Fraser and Smith's "index of hypoglycaemia unresponsiveness" is 320 (normal 550 ± 70). The result of this test, therefore, was further evidence for the presence of a lesion in the anterior hypophysis.

May 1.—Urinary 17-ketosteroid assay (Fraser and Smith, 1941): result—zero figure in 24-hour sample of urine, using Callow and others' (1939) modification of the method of Dingemanse, Borchardt, and Laqueur (normal value for women, 1.7 to 12.6 mg. in 24 hours). After attending for a blood count on April 2, Mrs. W. was unable



to report here again. She received no specific treatment and slowly weakened. She died on Oct. 6, 1943, of cachexia and heart failure.

Necropsy (Oct. 6, 1943).—Dryness and desquamation of the skin, oedema of legs; moderate amount of clear fluid in pleural and pericardial sacs; very small thyroid (6.5 g.); thymus not seen; small heart (150 g.); fibrosis at apex of left lung (right 380 g., left 240 g.); thin intestinal wall; small liver (650 g.); spleen, 65 g.; cancerous ulcer in pyloric antrum of stomach 1 in. across and puckering the peritoneum; no metastases or neoplastic glands; adrenals atrophic—combined weight 5 g., cortices very thin, medullae not obvious; kidneys 85 and 100 g., capsules strip smoothly, fine cortical cysts, cortices slightly narrow; tiny uterus (25 g.) and ovaries (3 g. the pair). The base of the brain was hardened *in situ* by formalin in the skull overnight. The pituitary, when removed still attached to the brain, appeared as a collapsed empty shell.

Histology.—Thyroid: Increase of fibrosis. Adrenals: Partial atrophy. Uterus: Atrophy of endometrium and myometrium. Ovaries: Atrophy. Left lung apex: Fibrosis; anthracosis. Liver: Fat ++ ; variable size of cells and nuclei. Kidneys: Exudate in glomerular spaces; some tubular debris. Spleen: Follicular fibrosis. Pyloric ulcer: Adenocarcinoma. The pituitary was not sectioned; the base of the brain, with attached hypophysis, was given to the Royal College of Surgeons.

Summary

A case of Simmonds's disease is described in a woman aged 59, due to necrosis of the anterior pituitary dating from a confinement 27 years before.

Attention to the obstetrical history makes the presumptive diagnosis simple in this condition.

Among other clinical pathological tests the results of the insulin sensitivity test and the urine 17-ketosteroid assay added weight to the diagnosis.

Necropsy revealed a general splanchnomicria as expected, but also an "early" pyloric carcinoma which was not expected. Was this a coincidence, or was it another result of the pituitary lesion?

I am grateful to Drs. F. M. Rose and F. B. Smith for their co-operation and permission to publish, and to Mr. G. E. Delory, M.Sc., for help with the biochemical tests. I wish also to thank Lieut.-Col. H. L. Sheehan for much interesting advice and correspondence.

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J. D. Durance (*J. R.A.M.C.*, 1945, **84**, 280) maintains that, though there are other causes of subconjunctival petechiae, it is safe to treat as positive all cases of pyrexia or mental disturbance exhibiting these signs on the first day of the disease during an outbreak of cerebrospinal fever, and begin chemotherapy immediately. The absence of subconjunctival petechiae is a good prognostic sign.

HAEMOLYTIC DISEASE AND CONGENITAL SYPHILIS IN SIBLINGS

THE ROLE OF THE Rh FACTOR

BY

MARJORY N. McFARLANE, M.B., Ch.B.

(From the Departments of Pathology of the University of St. Andrews and Dundee Royal Infirmary)

It has been alleged that congenital syphilis may give rise to a clinical picture identical with erythroblastosis (Holt and McIntosh, 1933). A history of neonatal jaundice, foetal dropsy, or intra-uterine death in successive pregnancies has been regarded in the past as confirming the diagnosis of syphilis. On this supposition, even in the absence of serological and histological evidence of the disease, women with such unfortunate obstetric histories have been subjected to prolonged courses of antisyphilitic treatment. Syphilis and erythroblastosis foetalis (or haemolytic disease of the newborn, as it is now called—Parsons, 1943) resemble each other in that each may cause the repetition of obstetric disasters; but the obstetric histories differ characteristically in the two conditions, the earlier children usually being spared in haemolytic disease but dying in syphilis. Levine *et al.* (1941) discovered that the chief cause of haemolytic disease lies in iso-immunization of the mother to the blood-group factor Rh, present in the foetal cells and absent from her own. Tests for the Rh factor are thus of value in differential diagnosis, and provide a criterion by which the importance of syphilis, umbilical sepsis, or other alleged cause of erythroblastaemia may be assessed. Since the discovery of the possible results of blood-group incompatibility between mother and foetus the formerly alleged causes of erythroblastosis can no longer be accepted until it has been clearly proved that there is no evidence of, or basis for, iso-immunization. There does not appear to be any published example of erythroblastosis in a newborn syphilitic infant in which a concurrent Rh incompatibility between the mother and child has been excluded. Henderson and Macgregor (1943) reported a case of hydrops foetalis (haemolytic disease Type I) in the child of a syphilitic primigravida with anti-Rh agglutinin in her serum and with unequivocal histological evidence of erythroblastosis in the foetal tissues. This case supports the new concept that the foetal condition was attributable to the Rh incompatibility rather than to the syphilis.

I have recently observed a family in which haemolytic disease and congenital syphilis have appeared in siblings. This family illustrates well the value of tests for the Rh factor in confirming the diagnosis of haemolytic disease in the presence of maternal syphilis.

Case Notes

Mrs. C., aged 34. Group A_1 Rh-negative (rr). Husband overseas. Obstetric history: (1) 1935: female, premature, alive, Group A_1 Rh-positive. (2) 1939: male, full-time, died of icterus gravis neonatorum (haemolytic disease Type II). (3) 1941: six-months miscarriage. (4) Female, full-time, alive, Group O Rh-negative.

In 1939 the patient gave birth to a full-time male child who became jaundiced some hours after birth and died two days later. This infant was put to the breast, and on account of jaundice and petechiae in the skin he was given an intramuscular injection of 18 c.cm. of maternal blood. During this pregnancy the diagnosis of maternal syphilis had been made, and the mother continued to receive antisyphilitic treatment more or less regularly from that time until early in the fourth pregnancy. Post-mortem examination of the second infant revealed widespread erythroblastosis of the organs with abundant extramedullary haemopoiesis, the appearances being characteristic of haemolytic disease Type II. Histological evidence of syphilis was entirely lacking in all the organs and tissues.

In 1942, in the course of a study on haemolytic disease of the newborn, this patient's blood was first examined for the Rh factor and found to be Rh-negative. It was then disclosed that she had had a miscarriage about 20 months previously, and, in spite of the lapse of time since her last pregnancy, powerful anti-Rh agglutinins were present in her serum (titre 1/128).

In 1944, during the fourth pregnancy, the maternal serum was tested repeatedly from the fourth month onwards, from which time the patient remained under observation in hospital on account of her cardiac condition. The Wassermann reaction was positive, and the serum contained anti-Rh agglutinin type anti-Rh_1 (i.e., the and rho$_1$) throughout the remainder of the pregnancy (titre 1/128).

In view of the previous occurrence of haemolytic disease in this family preparations were made to give the fourth baby a transfusion of Rh-negative blood immediately after birth if its cells were shown to be Rh-positive or agglutinable by the irregular antibody in the maternal serum. The fourth child, a female weighing 8 lb. 10 oz., was born spontaneously at term; tests on the cord blood within an hour of birth showed that this baby was Rh-negative and that its cells were not agglutinated by the mother's serum. The cord blood gave a positive Wassermann reaction, its haemoglobin content was 140%, and there was no erythroblastaemia. As the maternal and foetal bloods were compatible as regards the Rh factor, blood transfusion was not given and signs of haemolytic disease never developed.

Comment

This family provides a valuable commentary on the supposition that congenital syphilis may cause erythroblastosis. In the second child erythroblastosis was present, but naked-eye and histological evidence of syphilis was lacking. The presence of powerful anti-Rh agglutinins is proof that iso-immunization to the Rh factor had occurred and may reasonably be supposed to have been responsible for the foetal haemolytic disease and possibly for the subsequent miscarriage. The outcome of the fourth pregnancy, however, shows conclusively that serological evidence of syphilis in the mother and infant may be present without foetal erythroblastosis, even in a family in which haemolytic disease has previously appeared. Haemolytic disease did not develop in this child, in spite of the powerful anti-Rh agglutinins in the mother's blood, owing to the lack of the Rh-positive antigen in the foetal cells. From the persistently positive Wassermann reaction it may be inferred that syphilis was not eradicated from the mother, and time will show whether the infant develops signs of congenital syphilis other than the positive Wassermann reaction. There is at present no satisfactory evidence to show that congenital syphilis or other infection can bring about, by itself, the clinical and pathological features of erythroblastosis foetalis, and blood-group incompatibility is the only proved cause of this neonatal disorder.

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GLANDULAR FEVER WITH NEUTROPENIA

BY

GERALD SLOT, M.D.

Lieut.-Col., R.A.M.C.; Officer i/c Medical Division

AND

F. D. HART, M.D.

Major, R.A.M.C.; Medical Specialist

Lieut.-Col. Shirley Smith and Major Trevor Shaw in their valuable article in the *British Medical Journal* of April 28, 1945, on treatment of anginous forms of glandular fever with intravenous arsenic, stress the fact that neutropenia is present in many cases. In the series they quote, only two cases have a marked neutropenia; the others can be considered low normals. The case reported below shows an even higher degree of neutropenia than any referred to in their paper. Like them, owing to exigencies of oversea service, we have not had full access to literature, but neither of us remembers neutropenia of a marked degree associated with glandular fever; nor is it mentioned in any of the standard works on medicine or haematology we have consulted.

Case History

Lieut. A., aged 27. Previous history: malaria, 1943 (type uncertain; ? B.T.). The patient was admitted to a military hospital, C.M.F., with the diagnosis of "loose body in left knee-joint." After a period at a convalescent depot, Major Bickerton operated on March 3, 1945. That evening, while on routine sulphathiazole by mouth, Lieut. A.'s temperature rose and continued to swing from 97° to 104.4°. His only complaint was tightness of the throat Many blood slides were negative for malaria. Quinine (10 gr. t.d.s. for 3 days) had no effect on the fever. A few crepitations appeared at the right base. Sulphathiazole was discontinued on March 8 (total 30 g.). On March 13 he complained of a sore throat, and both tonsils were found to be enlarged, with a follicular exudate. Enlarged glands, not tender on palpation, were present in both axillae and the right side of the neck. The spleen became palpable (one fingerbreadth) in the next few days, but was never tender. By March 19 the fever began to abate by lysis. Crepitations were present over both bases. No exudate was now found on the tonsils. Painless enlarged glands, never tender to palpation, were present in groins, axillae, right side of neck, supracondylar regions along the brachial arteries, and just posterior to the right nipple. His only complaints at this time were of slight tenderness over the roots of both canines and tingling of a throbbing nature in the fingers, in the ulnar distribution, which disappeared as the glands subsided, but could be reproduced by pressure over the still slightly enlarged glands above the elbow. On March 22 temperature was normal. Since then the glandular enlargement has disappeared, but the spleen even now (June 5) is still palpable half a fingerbreadth on full inspiration, and up to three weeks before that date the moist sounds persisted in both lower lobes. As the neutropenia first noted on April 2 persisted, the effect of pentide was tried on April 15. Three injections of 10 c.cm. I.M. caused fever, shivering, flushes, nausea, and splenic contraction. Blood slides were negative, and the symptoms were without doubt directly attributable to the injections, as he noticed them after every injection, becoming more marked each time. Injections of adrenaline failed to cause splenic contraction or alteration in the blood picture.

Investigations.—(1) White blood cells (see Table). Hb 80% (Haldane) on April 6. (2) Blood slides × 12—negative for malaria parasites. (3) Blood culture—negative after 14 days. (4) Paul-Bunnell (Stitt's technique) on March 20—negative; April 13—sheep cells agglutinated to 1/128. (5) Agglutinations to *B. proteus* OX 2 and OX 19—negative. (6) Kahn—negative. (7) Formol-gel—negative.

White Cell Counts

	W.B.C.	Polys.		Lymphs.		Monos.		Eosins.		
		%	No.	%	No.	%	No.	%	No.	
8/3/45	5,700	64	3,648	28	1,603	7	399			
11/3/45	11,800	38	4,484	50	5,900	8	944	1	118	
20/3/45	7,600	33	2,508	66	5,016	1	76			
2/4/45	5,000	17	850	74	3,700	8	400	1	50	
4/4/45	5,550	16	880	78	3,900	5	275	1	55	
6/4/45	5,300	23	1,219	72	3,816	4	212	1	53	Hb 80%
12/4/45	6,200	12	740	72	4,495	5	310	0·5	31	
15/4/45	Pentide, 3 × 10 c.cm. I.M.									
17/4/45	7,100	55	3,940	42·5	3,017	3	213			
18/4/45	4,600	33	1,518	56	2,576	10	460	1	46	
19/4/45	4,800	29	1,392	64	3,072	6	288	1	48	
21/4/45	6,600	15	990	73	4,818	8	528	4	264	
	10 mins. after 7 minims adrenaline subcutaneously									
	8,750	13	1,131	78	6,786	8	696	1	87	
26/4/45	5,850	27	1,566	61	3,538	7	406	5	290	
24/5/45	5,300	25	1,325	69	3,657	3	159	2	106	
6/6/45	8,400	25	2,100	66	5,544	4	336	3	252	

Of interest is the persistent neutropenia since April 2, apart from the immediate effect of 30 c.cm. pentide I.M. The patient was perfectly well and making a normal convalescence all this time, and throat and mouth were normal. Crepitations were so persistent at both bases that atypical pneumonia was suspected, but two skiagrams of the chest were normal. The persistence of splenic enlargement is not unusual in these cases; in this instance it will be of interest to see if the blood count returns to normal at the same time as the spleen.

It is thought sulphathiazole therapy played no part in the production of any of his signs, as he had had only a few doses at the time of operation, which was also the time of onset of his fever. Nevertheless, neutropenia, splenomegaly, and glandular enlargement are known to occur as toxic reactions in sulphonamide therapy, and it is just possible that the drug alters the body's response to the infection of glandular fever. The whole course of the disease, however, and the persistence of the neutropenia are against a drug intoxication.

Comment

Sulphathiazole, given as a routine in clean knee cases as pre-operative preparation, was discontinued 5 days before the onset of throat symptoms. The neutropenia was not permanently affected. The effect obtained by injections of pentide lasted only 36 hours. Moist sounds occurred in the chest—a feature we have noted in other cases of glandular fever. They are similar to those heard in atypical pneumonia, except that they are bilateral. These signs persisted for some weeks. The spleen is still palpable, about half a fingerbreadth below the

costal margin, 3 months after the onset of the disease, though the patient is now completely symptomless and has been so for seven weeks.

We should like to emphasize the association of persistent neutropenia and splenomegaly with infectious mononucleosis.

Medical Memoranda

Paratyphoid Ulcer of Rectum

The following case is noteworthy from the point of view of the differential diagnosis of diseases of the rectum and because of the rarity of its occurrence.

History of Case

On June 27, 1944, a sergeant air gunner, aged 21, was admitted from sick quarters to an R.A.F. hospital as a case of neoplasm of the rectum. On rectal examination the unit medical officer had felt a "mass." The patient gave a history of constipation for 7 days while on leave. On return to his unit he passed blood and mucus per rectum. He did not feel well, but he had no pain. He stated that he had lost weight and that his relatives told him while on leave that he looked much thinner.

On examination the abdomen was slightly distended and resonant. There was no tenderness or rigidity, and the liver and spleen did not appear to be enlarged. Per rectum a friable adherent mass was felt on the left side. The ulcer had a raised irregular edge, and blood was present on the examining finger. No unusual enlargement of inguinal nodes was felt. Heart and lungs were normal. The oral temperature was 100.4° F. and pulse rate 80. Next day proctoscopy revealed an ulcer the size of a half-crown on the left side of the rectum. It was oozing blood. A piece of the wall was excised for examination, but previously a swab of the base of the ulcer was taken for culture. Sigmoidoscopy revealed no other site of ulceration, and merely a congested mucosa.

Further investigations included the following: June 28: haemoglobin, 80%; haematocrit, 44%; W.B.C., 8,200 per c.mm. (neutrophils 60%, lymphocytes 37%, monocytes 3%). June 29: Chest skiagram—"Lung fields clear." June 30: Kahn negative. Also on June 30 the report on the swab of the ulcer was: "Organisms morphologically, culturally, and serologically resembling *B. paratyphosus* B isolated." The result was communicated to Air Commodore Morton, who was examining the biopsy specimen.

The patient was transferred to the medical division, and his further progress was that of a typical case of paratyphoid B infection, with serum agglutinins showing a rising titre of paratyphoid B. He made a good recovery, and on discharge Squad. Ldr. Petch (Medical Specialist) made the following comment: "A case of paratyphoid B presenting with an ulcer in the rectum. He was extremely ill for this infection, but has made a good recovery. Inoculation state as judged by records in pay-book should have afforded protection."

G. Gordon Lennon, M.B., Ch.B.,
Squad. Ldr., R.A.F.V.R.

Foetal Erythroblastosis and Hydrops in Twins

The occurrence of a case of hydrops and erythroblastosis in twins born to a primipara presents some unusual features. Comment on the cause of the condition and the chance of a normal baby in a future pregnancy will be welcomed.

Case Report

Mrs. X., a primipara aged 24—last menstrual period Sept. 23, 1944—when first seen on Jan. 10, 1945, had slight swelling of the right ankle, which she said had been quite common even before pregnancy. She had been treated for a threatened abortion in December, and was considered to be due in May. Her blood pressure was normal at frequent examinations, but the swelling of the right ankle increased. Her Wassermann reaction was negative. In March both legs became swollen, and she complained of giddiness and dyspnoea. B.P. 110/76. A specialist reported her cardiac condition to be normal. There was some hydramnios. In April she was advised to stay in bed. On May 2 she was admitted to the infirmary in labour, with oedema of the legs and feet and albuminuria. B.P. 138/100. After a short labour she was delivered of a male infant, weighing 7 lb. 3 oz., who was grossly oedematous; the heart beat for a few minutes, but he never breathed. The second twin—a male weighing 3 lb. 10 oz.—was delivered 20 minutes later; he was oedematous over one shoulder and the side of the neck. He lived a few days. A large single oedematous placenta was expelled.

Mrs. X.'s blood count was: Hb, 72%; red cells, 3,752,000 per c.mm.; colour index, 0.96; leucocytes, 10,000 per c.mm. (polymorphs 82%, lymphocytes 16%, eosinophils 2%). The red cells were a little irregular—no reticulocytes. No abnormal white cells were seen. The Wassermann and Kahn reactions were negative. Blood urea: 20 mg. per 100 c.cm. Blood bicarbonate: 61.3 c.cm. CO_2 bound by 100 c.cm. plasma at N.T.P. Blood group: O (IV Moss) Rh-positive. There did not appear to be any irregular agglutinins in her serum.

Mr. X.'s blood group was A (II Moss) Rh-positive. His cells are agglutinated by Mrs. X.'s serum only to a titre of 1 in 32, so that a high anti-A titre is not the explanation of the case. Wassermann and Kahn reactions, negative.

Mrs. X. left the infirmary in 18 days with a normal blood pressure and no oedema. There was a faint trace of albumin in the urine. Urea, 1.03%. No blood pus or casts were found.

Post-mortem Report on Baby X.—There is general oedema of the whole body and serous membranes. Lungs: Complete atelectasis. Heart: The foramen ovale is very large. Liver: Very small and tough, with a large haemangioma on the surface. Spleen, small. Kidneys and suprarenals appear normal.

Report on Sections Taken at Time of Necropsy.—Kidneys absolutely normal, with nothing pathological in them. The suprarenals are also quite normal. The spleen is extremely congested, and there are no lymphoid follicles; it seems to consist entirely of reticulo-endothelial cells, and the vessel walls are very fibrous and thick. The liver is very congested, with a great quantity of blood pigment in it. There is a large amount of round-cell infiltration, and Glisson's capsules are extremely fibrotic, but apart from this there does not seem to be much fibrosis. The lungs show complete atelectasis.

The second baby was sent to a voluntary hospital as it was becoming more oedematous; it died there after a few days. A blood count showed: Hb, 163%; R.B.C., 7,100,000 per c.mm.; colour index, 1.15; leucocytes, 53,400 per c.mm. (polymorphs 20%, lymphocytes 70%, monocytes 10%). Though the stained film showed tremendous numbers of nucleated red cells, while counting a hundred white cells 1,010 nucleated red cells were seen. No necropsy was performed.

My grateful thanks are due to Dr. Mackarell, pathologist, and to Dr. O'Donovan for reports and helpful advice in this case.

Nuneaton. Eileen Malone, L.R.C.P.&S.I.

A Case of Volvulus of Small Intestine

The following case may be of interest to readers by reason of its comparative rarity and because of the difficulty of early diagnosis.

Case Notes

The patient was an Army officer aged 34. He had had an appendicectomy (two scars), and had suffered from "heartburn" off and on for years. On admission on July 25, 1944, he complained of very severe pain in the mid-abdomen since 1 a.m. and had vomited bile-stained fluid. Pulse 74, temperature normal; rigidity and tenderness of both rectus abdominis muscles, the right more so than the left; no distension apparent. He was very ill and, although he did not present a typical picture of a perforated duodenal ulcer, it was thought wise to "look and see," after consultation with the medical specialist.

Operation (1).—Upper right paramedian incision. Nothing abnormal discovered (no perforated duodenal ulcer and no obstruction; gall-bladder normal). After further intermittent attacks of pain and vomiting bile, he eventually became acutely obstructed and very ill. Enemata yielded no result. Distension very marked.

Operation (2).—Abdomen opened on July 28 by a lower right paramedian incision of ample length. Obstructed distended coils of gut presented, and were traced to the now complete volvulus of small intestine near the base of the mesentery on the right side, by the sacro-iliac synchondrosis. The purple loop was untwisted, and soon recovered its colour and sheen on bathing with hot saline. The abdomen was then closed without drainage.

He was put on the dangerously ill list, with flatus tube and eserine every four hours. On July 31 he was off the "D.I. List"; general condition excellent. On Aug. 2 he could walk round his bed. After an uninterrupted recovery the patient was discharged to sick leave on Aug. 21 in Category "D."

Commentary

The diagnosis of this case in the early stages was difficult. Now that we are "wise after the event," it is fairly obvious that his early signs and symptoms were those of *intermittent partial* obstruction of the small intestine, due to a subacute volvulus. The affected loop was evidently swinging like a ship at anchor, partially folding over and then swinging free again, with temporary remissions of symptoms between July 25, when early laparotomy revealed nothing, and July 28, when a complete torsion of the loop on its mesenteric axis took place, and "stayed put," causing acute obstruction. The customary enormous distension associated with the ordinary volvulus (of the *sigmoid* colon) was absent, as might be expected in this case, where the obstruction was much higher up the tract.

No attempt at fixation to prevent recurrence was made, since all of the expedients recommended are unsatisfactory and ineffectual.

The case is of further interest in that volvulus of the *small* intestine is very uncommon. Tully Vaughan collected 21 cases only; and Rowlands and Turner of Guy's stated in 1937 that "in several cases difficulties were so great and the appearance so puzzling that the operators did not recognize the condition during the operation." J. B. Roberts also refers to two other cases in which the lesion was discovered only at necropsy.

I would like to express my thanks to Brig. R. P. Cormack, O.B.E., D.M.S., East Africa Command, and to Lieut.-Col. R. P. Leake, O/C Station Hospital, Mauritius, for permission to publish this case.

R. Salisbury Woods, M.D., F.R.C.S.,
Late Major, R.A.M.C.; Surgical Specialist, E.A.C.

Reviews

BASIC TRAINING IN ANATOMY

Anatomy as a Basis for Medical and Dental Practice. By Donald Mainland, D.Sc., M.B., Ch.B., F.R.S.Ed., F.R.S.C., Dalhousie University. (Pp. 863; 61 figs. 35s.) London: Hamish Hamilton Medical Books.

We are all inclined to hold views on education that reflect the kind of occupation we follow, and on medical education the views are as diverse as the fields of work that fall within the sphere of the medical profession. On one fundamental point there is a dichotomy of views. At the one extreme it is said that the "medical sciences" should provide vocational data, by memorization if necessary, without wasting time on the background or setting of these data; at the other extreme it is claimed that time is well spent on education in basic principles, upon which the vocational data can then be grafted. In the wholesome and refreshing book before us Prof. Mainland's standpoint approaches the latter view, and he has given us a stimulating guide to a course of study in anatomy. Characteristic features of his method are the constant urge to make personal observation on the living subject, and the initiation of the student into the study of the literature.

After a short section with an arrangement that is chiefly historical, Mainland introduces the main part of his work with a section on general anatomy. This is followed by the section on regional anatomy, which occupies three-quarters of the book. A series of appendices has made it possible to omit from the text various details such as ossification dates. Under general anatomy certain systems have been so treated as to stimulate interest in normal and disturbed function; but some systems have unfortunately been omitted. One chapter, on the body as a whole, is a compendium of important topics that often receive insufficient attention in the curriculum, among which mention may be made of growth and age-changes, the effects of environment, and the causes and measurement of individual variation; racial problems are, however, discussed too exclusively with reference to those of the American people. Valuable to the student will be the brief exposition of simple statistical methods. In the section on regional anatomy the author has made a praiseworthy and valiant attempt to give the "lowest common denominator" of the requirements of the various fields of clinical work, in pleasing contrast to the present unfortunate tendency for the curriculum to be the sum of a series of minimum requirements. In this difficult matter of selection it is not possible to please all. Those who expect an encyclopaedia will complain of omissions; some who are engaged in such fields as biochemical medicine and therapeutics may think there is too much. But the author has deliberately set out to cater for the future general practitioner or dentist, and his selection of material has been drawn from a wide field with good judgment. Practical study of the movements of joints has been stressed at the expense of long lists of ligaments. The coronary arteries receive as much space as all the hamstring muscles, while pelvic variations receive four times the space of either.

In his approach to the particular by way of the general, Mainland has avoided an obvious risk that applies to all the medical sciences—that of demanding an effort in the study of principles which may be out of all proportion to the vocational superstructure. The ability of the mediocre student to grasp and apply principles is limited, and the comparative and embryological approaches in anatomy must be as restrained as the elaborate symbolism of chemical structure should be in some other fields. Mainland has found a simple embryological approach useful, for example, in giving us a rationale for the courses of the recurrent laryngeal and phrenic nerves. But he has scarcely explored the possibilities of the comparative approach, while the omission of histology is a drawback that is evidently realized by the author, for he urges on the student the importance of linking up histology with gross anatomy for himself.

Several assumptions are implicit in the style and substance of the book. It is essentially a combination of a practical book with a guidebook to the library; it is not a dissecting manual. Access to a first-class library is indeed essential if full profit is to be derived from the numerous references, which have rendered this book a guide to a far wider field than that covered by the usual overgrown textbook. The extensive bibliography will be valuable to student, graduate, and teacher alike, and it has at the same time relieved the text of much detail that is not wanted by every reader. But the inclusion of some more references to work in languages other than English would have added much to the value of the list, and it would have encouraged wider reading than the English-speaking student (or graduate) is usually willing to undertake. The somewhat synoptic style may be found irritating if one undertakes continuous reading; it is better suited to a notebook—"Cervix is only a button-like projection in vagina" (p. 479). Some of Mainland's words of advice seem more suitable for oral instruction—e.g., on the spelling of the word "plantar" (p. 8). He is, however, probably right when he assumes the student's need for a training in logic, in the use of such words as "explanation" and "normal," and, indeed, in the "Meaning of Meaning"; and he rightly insists on the importance of the accurate use of words and terms for the avoidance of misunderstanding. As the author remarks in his introduction, this work is not an "Anatomy made Easy"; it is a guidebook to hard work and hard thinking. For self-development and the acquisition of essential facts it is highly recommended to the student.

A. B. APPLETON.

DIAGNOSIS AND TREATMENT OF MALARIA

Malaria: Its Diagnosis, Treatment and Prophylaxis. By William N. Bispham. (Pp. 197; 5 plates. $3.50, or 19s. 6d.) Baltimore: The Williams and Wilkins Company; London: Baillière, Tindall and Cox.

One result of the war has been the bringing of very large numbers of medical men into positions where, often with little previous experience of the disease, they are called upon to diagnose and treat cases of malaria. To those who find themselves in such a position the recently published volume on the diagnosis, treatment, and prophylaxis of malaria by Col. W. N. Bispham, U.S. Army Medical Corps (ret.), will be found particularly helpful. For while keeping in view the object indicated by the title it gives in an easily readable style just enough about malaria as a whole to make the book generally informative. That this is quite necessary in the achievement of its object will be apparent if one considers that a medical man at the present time cannot competently diagnose or treat malaria without at least some knowledge of the malaria parasites and even about the aetiological cycle and the mosquito that transmits the disease. The merit of the work is that it meets these requirements with just that amount of detail necessary and no more. There is a brief summary of the history of malaria and its distribution. This is followed by a chapter on the aetiology with a brief account of the malaria parasites, and a very brief but adequate chapter on the mosquito and one on epidemiology. Symptomatology and complications are dealt with at greater length, as are diagnosis, treatment, and prevention. There are also short chapters on pathology, malarial immunity, and blackwater fever. Prof. Coggleshall contributes a chapter on the prevention and treatment of malaria in West Africa.

If there be any criticism it is perhaps that some of the sections might with advantage have been fuller. Thus, while emphasis is rightly given to the fact that laboratory diagnosis of malaria is the only positive method, it is doubtful whether the brief directions for technique of blood staining, in which Wright's modification of Romanowski's stain is given with no mention of the almost universal use of Giemsa or Field's stain, are as adequate as they might have been. There are one or two other points that might be criticized, as, for example, the statement on page 43 that three or four feedings are necessary for a mosquito to transmit infection. The book remains a most readable and useful summary for the medical officer in need of information about malaria.

NEUROPSYCHIATRY

Recent Advances in Neurology and Neuropsychiatry. By W. Russell Brain, D.M., F.R.C.P., and E. B. Strauss, D.M. Fifth edition. (Pp. 363; illustrated. 18s.) London: J. and A. Churchill. 1945.

Convinced that, after all, neurology and psychiatry cannot be divorced, especially in view of the new physical therapeutic procedures, the authors have again joined forces to produce this edition. One of the advantages of war is the stimulus given to the study of medicine and surgery, and in no depart-

ment of the science and art is this more apparent than in neuropsychiatry. Consequently this book has had almost to be rewritten. Attention is paid to such innovations as the modern surgical treatment of head injuries (in a chapter contributed by Northfield); to peripheral nerve lesions; to shock therapy and leucotomy for certain psychotic disorders; to removal of intervertebral disks for sciatica and of the thymus gland for myasthenia gravis; and to the use of penicillin. Diagnostic methods such as electro-encephalography and ventriculography are fully discussed. At the same time the exposition of recent ideas covering practically the whole field of neurology and psychiatry has been brought up to date. It is difficult to see how the neurologist, the psychiatrist, the neuropsychiatrist, or the psychotherapist (whichever title the specialist in this field chooses to adopt) can do without this book, and so rapid is the advance in his chosen subject that he will have to scrap his old editions and buy this new one. Certainly the authors are to be congratulated on their work, but we shall be surprised if they are not called upon to produce a sixth edition very soon.

INTRODUCTION TO COLLOIDS

Colloids: Their Properties and Applications. By A. G. Ward, M.A. Blackie's "Technique" Series. (Pp. 133; illustrated. 5s.) London and Glasgow: Blackie and Son. 1945.

This book on colloids has been prepared with the object of supplying an introduction to the subject more suitable for the beginner than the books which deal with it in more exhaustive and more mathematical detail. It contains illustrative references to a broad variety of subjects, which include rubber, clay, paints, biological phenomena, and detergents. We note a few instances in which there is a lack of a word, a phrase, or a sentence which would have been helpful to the uninstructed, as under the term "solubilization," where it is stated that "many substances which are almost insoluble in water show a considerable solubility in soap and other detergent solutions." But what sort of substances are the many that behave thus? If the text had read, "many substances such as benzene," the reading would have been easier. Yet on the whole the book has been well written, and it contains the right kind of information for the beginner.

The chemistry and physics of colloids have been involved in industrial processes and in the arts since the earliest times; but while this chemistry and this physics have hitherto been empirical, and while the study of colloids has been based largely on established practices, the knowledge of colloids has now reached the stage at which it is applied to guide and govern those practices. Industrialists can therefore no longer omit the study of colloids as an adjunct to their equipment. This book will provide a good foundation for the building of such knowledge.

Notes on Books

The Analysis and Interpretation of Symptoms, edited by Dr. Cyril M. MacBryde, is published by the J. B. Lippincott Company at 25s. The title of this book arouses expectations which are not completely satisfied. It is not so much an analysis of symptoms as a collection of clinical essays by different authors which have already appeared in *Clinics*. Two of these essays have the words "differential diagnosis" in their titles and the subject is approached from this point of view, rather than from that of the clinical scientist or physiologist. The subjects chosen are nervousness and fatigue, fever, headache, thoracic pain, cough, haemoptysis, abdominal pain, haematemesis and melaena, jaundice, joint pains, and obesity. The articles differ in quality; the one on cough and haemoptysis degenerates into a catalogue, while on the other hand Leon Schiff gives an excellent account of haematemesis and melaena, as might be expected from his own research work in this field. In general, however, the text lacks the concentration of a scientific monograph or the unity of a collection of essays by an individual author. The book, which is well produced, has reached a second impression, and one wonders at the market for this type of work in the United States, especially in these days when material and labour for printing books are scarce, and when general practitioners are lucky if they can find time to read the current journals.

We have received from the hon. secretary, Dr. W. H. McMenemey, Royal Infirmary, Worcester, a copy of the first issue of *Proceedings of the Association of Clinical Pathologists*, dated July, 1945, and published at 5s. For some time the Association has felt the need of a journal of its own, and the opening number is a well-produced magazine of 50 pages and a number of plates for photomicrographs. The contents include Dr. A. F. Sladden's presidential address in 1943 on "The Significance of the Laboratory," and five other papers, and a report on the European Association of Clinical Pathologists. The editor is Dr. A. G. Signy, Ashford County Hospital, Ashford, Middlesex.

A *Short Anglo-Polish Medical Dictionary*, by Dr. W. Tomaszewski, has been published by E. and S. Livingstone at 8s. 6d. and 4d. postage. The compilation and printing have had support from the Kosciuszko Foundation of New York. It is appropriate that this booklet should be published by an Edinburgh firm, because the Polish School of Medicine was established in that city during the war through generous action by the University and the civic authorities.

Preparations and Appliances

AN INDWELLING SYRINGE FOR PENICILLIN ADMINISTRATION

Dr. H. F. Barnard, Pathologist, E.M.S. Hospital, Driffield, writes:

The outstanding advantages that penicillin offers are offset by inconveniences that become more apparent as its use spreads to the small hospital and the patient's home, where skilled attention is limited. The three-hourly injection, and the special precautions needed to avoid bacterial or chemical contamination of the solution with consequent loss of potency, call for constantly available skilled help, whilst the continuous drip infusion, though avoiding the distress to the patient of repeated injections, still calls for preparation, care, and watchful attention.

The watch-driven syringe described has been in use at this hospital since November, 1944, and offers a solution to these problems until such time as oral administration or injections of greatly prolonged action are an established alternative. Last[1] has described an apparatus on this principle using a somewhat larger mechanism, a Record syringe, and a length of rubber tube leading to the patient; whilst Edwards[2] has described a hand-operated Record syringe and tube method.

The apparatus shown in Fig. 1 consists of a plastic base (A), 7 × 2 in., in which is set a pocket watch (B), adapted so that the hour hand drives a toothed rack strip (C) slowly forward, and the dose of penicillin in the syringe (100,000 units in 5 c.cm.) is delivered in 24 hours through a needle bent at a right-angle (D). The apparatus is attached to the thigh by means of adhesive strapping slipped beneath it and over the side-hooks. The all-glass "vim" syringe is then filled, and the right-angled needle, already attached, is guided through the circular hole and inserted into the skin, and the syringe is clipped into position. No further attention is required until 24 hours later, when the syringe is removed, boiled up, refilled, and, after rewinding and adjusting back the watch, is again inserted.

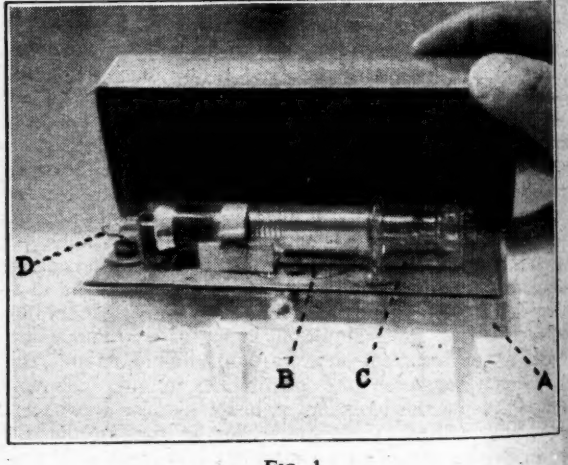


Fig. 1

The basis of the method depends upon the observation that a sterile solution in a good-quality all-glass syringe (such as the "vim") will remain sterile at room temperature at least for many days. At a concentration of 20,000 units per c.cm. penicillin as now available is a gummy product, and tends

to jam the syringe unless this is lightly greased with soft paraffin. Paraffin has no harmful effect on penicillin, but the stock bottle of paraffin should in the first instance be autoclaved.

As to stability, Kirby[3] has stated that penicillin as produced at present shows no appreciable loss of potency in solution in four days at 37° C. However, a considerable number of estimations with various makes have shown that, in the conditions of concentration and temperature in the syringe attached to the patient, as described, penicillin deteriorates by the end of 24 hours to approximately 60% of the original; i.e., some 20% of the whole day's dose may be lost. Against this dis-

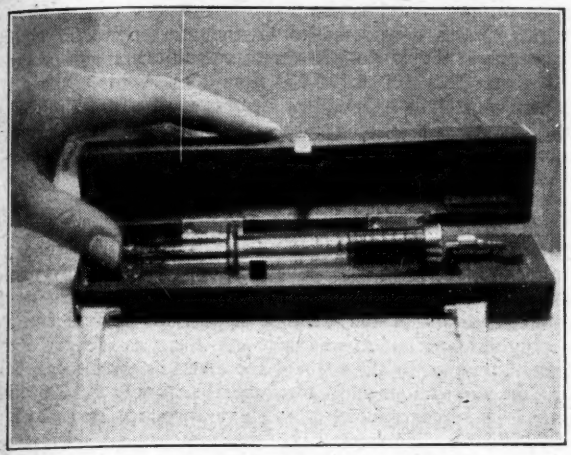


FIG. 2

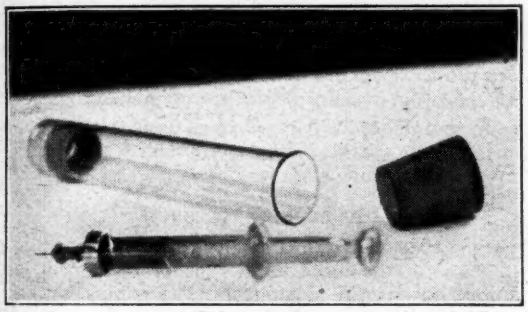


FIG. 3

advantage one may set the advantages of simplicity, reliability, and constant dosage. One finds that blood taken at the end of a day's run inhibits a test haemolytic streptococcus when diluted 2 to 4 times. Higher levels are obtainable, of course, by a more concentrated solution in the syringe.

As a simpler version, the second apparatus is shown in Fig. 2. It has no watch mechanism. The syringe is filled and clipped in as before, and thereafter every three hours the plunger is pushed forward to the next red mark on the syringe, there being eight such red marks. This manœuvre requires no sterility and, as has been proved in general practice, can be carried out in the patient's home by any reasonably intelligent member of the household. No discomfort is experienced by the presence of the apparatus, and the sleeping patient may even be unawakened by the giving of a dose.

Fig. 3 shows how the method can be applied to the keeping and giving of drops of penicillin for an eye or ear case (and also to many other procedures, such as blood grouping). The syringe with the needle cut short keeps the solution sterile through many manipulations and is stored in a tube with cork ring as shown, to keep the needle from touching the tube.

The syringes, needles, and box for the hand-operated method are obtainable from Messrs. Chas. F. Thackray, Ltd., 10, Park Street, Leeds, 1. It is hoped that the watch-driven apparatus will become available before long, shortage of materials having held up production for some months.

I wish to thank Dr. Panton, Director of the E.M.S. Pathological Service, for permission to publish this, and Flt. Sergt. Foulkes for his skilful work on the watch-driven model.

REFERENCES

1 Last, C. E. (1945). *British Medical Journal*, 1, 122.
2 Edwards, F. R. (1945). Ibid., 2, 86.
3 Kirby, W. M. M. (1944). *J. Amer. med. Ass.*, July, No. 9, 125.

MEDICAL DEFENCE UNION

ANNUAL MEETING

The Medical Defence Union, which is entering upon its sixtieth year, held its annual meeting on Sept. 16, when Mr. St. J. D. Buxton was unanimously elected president, Dr. Henry Robinson treasurer, and Dr. G. Roche Lynch chairman of the council committee. The retiring officers—namely, Dr. James Fenton, who relinquished the chair at that meeting, and Mr. E. D. D. Davis, the late treasurer—were congratulated on the manner in which they had discharged the functions of their offices and were thanked for their services.

Dr. JAMES FENTON, in a valedictory address, referred to the work of the council and its committees during the war. In the early days the staff was transferred to the suburbs, but in view of the inconvenience caused to members who came personally to seek advice, a return to Bedford Square took place in 1942. The Union had come through the war ordeal without scars and with increased strength, for since 1938 the membership had gone up by just upon 8,000, and stood to-day at 28,483.

In a reference to the very special problems facing demobilized medical practitioners, Dr. Fenton said that it was desirable to make it widely known that members of the Union returning to civil life would have everything possible done, within the scope of the Union's activities, to ease their burden if they needed such assistance. He urged again that members should provide headquarters with early information when they were threatened with litigation arising out of their medical practice. Not infrequently such cases were prejudiced by delay in seeking the Union's advice or by the taking of preliminary action without such consultation.

Joint Action

Good progress had been made, Dr Fenton continued, in discussions with the London and Counties Medical Protection Society and the Scottish Defence Union with a view to the establishment of a joint co-ordinating committee. The main object of this committee would be to define the broad policy to be pursued in common by the three societies, and it was also anticipated that matters arising from cases affecting members of any two of the societies, or all three of them, could be discussed and suitably determined. Each society would retain its separate individuality and freedom of action, but the societies would act jointly where a community of purpose would be served by so doing.

Some time ago the M.D.U. started consultations with the Society of Anaesthetists and the manufacturers of anaesthetic gases with the object of preventing the repetition of the few, but unfortunate, accidents which have arisen owing to anaesthetists giving gases from wrong cylinders. The problem had proved a difficult one owing to the need for experiment and the preparation of new forms of couplings. Even the colouring of the cylinders, which was one of the questions coming forward, was not a simple matter, because cylinders produced and used in other countries were affected. A short-term policy had been adopted for the transitional period, and those concerned were now engaged on a long-term policy dealing with new devices in order to make the apparatus foolproof.

He added that an increased number of cases in which advice was sought were being brought forward by doctors engaged in whole-time work for local authorities, and there had also been a number of difficulties to solve on behalf of medical officers working part-time for local authorities in clinics and dispensaries. The address concluded with a tribute to the legal adviser of the Union, Mr. Oswald Hempson, and to the secretary, Dr. Robert Forbes, and his staff.

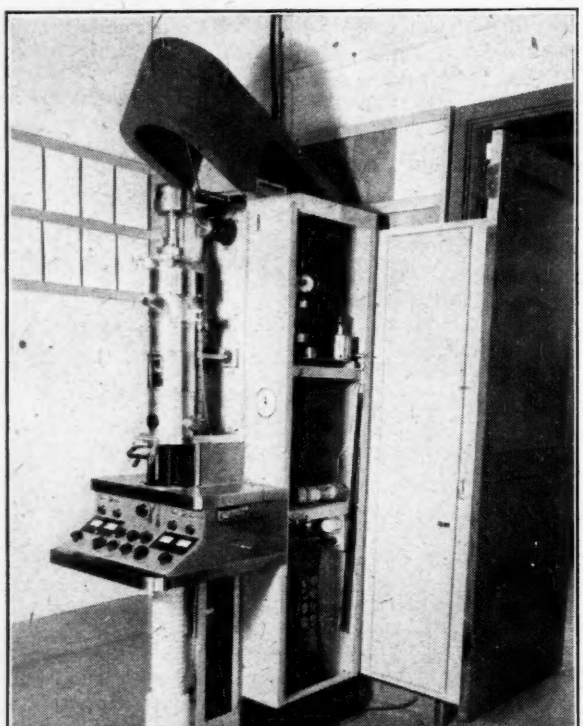
The Minister of Supply has made an Order which revokes and remakes in consolidated form the Control of Molasses and Industrial Alcohol (Nos. 11 to 17) Orders, 1941–2. Methanol, formaldehyde, metaformaldehyde, and hexamine are released from control, and licences will no longer be necessary for the acquisition, disposal, treatment, use, or consumption of these commodities. The maximum quantity of industrial alcohol (other than mineralized methylated spirits) which can be acquired, disposed of, treated, used, or consumed without a licence is increased from one gallon a month to sixty gallons in six calendar months.

THE ELECTRON MICROSCOPE

BY

JOHN H. JUPE

The electron microscope has been developed to overcome the limitations of the ordinary light microscope—limitations which have been hampering certain branches of scientific research. Little could be done to overcome these, however, until a fundamental discovery showed that electrons in motion could be deflected by an electrostatic or magnetic field. This can best be explained as follows. First, consider the electrons as charges of negative electricity. As such they will be attracted or repelled by electrostatic fields. But also, electrons in motion constitute an electric current, and as such will be deflected by magnetic fields. By producing either of these fields with the requisite strength and formation, groups of electrons travelling along a path in a vacuum can be concentrated or caused to diverge. Hence arises the term "electron lenses," which act on the electron stream in much the same way as glass lenses act on light.



R.C.A. universal electron microscope (covers removed). The cabinet housing the 50 kilovolt power supply is at the rear.

General Description

In the electron microscope there is an electron source—usually a heated cathode—corresponding to the light source of the ordinary microscope; there are also analogous electronic condensing and objective lenses. The electron stream is accelerated to very high speeds by the use of high voltages, and it takes on the characteristics of any thin object placed in its path. It is then allowed to fall on to a fluorescent screen, where a shadow image of the object appears. The whole process is very similar to screen radiography, except that cathode rays are used instead of *x* rays. In the same way, the results are only shadows of varying density and are not the images obtained by the usual reflection of light from objects—i.e., normal human vision, or an ordinary photograph.

The general appearance of one of the latest forms of the electron microscope is shown in the Fig. At the top of the stainless-steel column are housed the hot cathode for producing the electron stream and an electron "gun" for concentrating it. At the bottom of the column, just above the control desk, is the triple-sided viewing chamber. Below the panel is the oil diffusion pump for creating the necessary high vacuum in the microscope column; and in the cabinet at the rear is the 50,000 volt power supply unit and electrical control circuits.

The specimens are inserted through the round aperture immediately above the "first" image-viewing window. In the middle of the column, and to save the necessity for evacuating the whole of the microscope each time it is desired to change a specimen, there is a small chamber fitted with air locks. A similar device is used when the fluorescent screen for viewing the final image is replaced by a photographic plate. The instrument illustrated is made by the Radio Corporation of America and is considered to be the most powerful type of microscope in the world. Its direct magnification can be varied in 40 steps from 100 to 20,000 times; and with it the naked eye can see details as small as a quarter of a millionth of an inch. By taking photographs with this apparatus, normal photographic technique will permit the final magnification of the object to be more than 100,000 diameters.

Limitations and Achievements

It may be asked whether the electron microscope has parallel limitations to the light microscope. The answer is that it has, and for the same reasons—i.e., it is dependent on the resolving powers of the electron lenses, the human eye, and the photographic plate, and also on the wave-length of the electron stream. In the case of the electron microscope, however, the limitations are theoretically about 100,000 times smaller—i.e., it should be possible to produce magnifications of 200,000,000 diameters, since the best optical microscopes, using glass lenses and visible light, have a maximum limit of about 2,000 diameters. There are reasons for believing that the maximum resolving power may never be achieved, but this is not serious from the point of view of the practical microscopist, engaged in bacteriology, pathology, physics, metallurgy, etc., since magnifications 10 to 1,000 times greater than those of the ordinary microscope are of immense value.

Already a number of viruses have been observed for the first time, and the specific action of substances on bacteria have been investigated more closely.

Mounting of Specimens

Mounting specimens for the electron microscope is more difficult than for the more usual type of instrument, because the cathode-ray stream is stopped by anything thicker than about a millionth of an inch. The usual support is a film of nitrocellulose, not exceeding this thickness and itself supported by a metal gauze disk with about 200 meshes to the inch. To prepare such a thin film, a solution of nitrocellulose in a suitable solvent is placed on water and allowed to spread until a satisfactory thickness is attained. The metal disk is then placed on top of it, and a film of the desired thickness will harden between the meshes. The specimen is suspended in a volatile solvent, and a drop is placed on the film and allowed to evaporate.

Future Possibilities

In general, the technique of using the microscope is not very difficult and can be mastered by medical research workers in quite a short time; the apparatus is made perfectly safe from the point of view of high voltages and the user. What revelations lie ahead in the development and use of this instrument cannot be known. It is quite probable that it will help to settle the controversial question as to the exact dividing-line between living and dead matter.

My thanks are due to the Radio Corporation of America for providing the illustration.

The Medical Committee of the Scientific Film Association (c/o Royal Photographic Society, 16, Princes Gate, S.W.7) has issued a third handlist of recent films of medical interest. The three new films in the "Technique of Anaesthesia" series and "Movement of the Tongue in Speech" and "Penicillin" have all been completed very recently. "Effect of Thymectomy" is an amateur record for which the S.F.A. has obtained funds for copying and distributing; it hopes to make many more such films available as resources permit. "The New Lot" and "Evacuation of Casualties by Air" are both Services films which may now be shown to non-Service audiences.

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NUTRITIONAL MACROCYTIC ANAEMIA

The sternal puncture needle, by enabling us to study the bone-marrow almost as easily as we can the blood, has cleared up some of the obscurity about pernicious anaemia and its congeners. We know now that the pathognomonic feature of this large group of deficiency diseases of the blood-forming organs is the proliferation of megaloblasts in the bone-marrow and the restoration of the normal type of erythropoiesis by liver.[1] This may take place in circumstances in which the peripheral blood is not frankly megalocytic, as in some cases of pernicious anaemia of pregnancy[2] and tropical macrocytic anaemia.[3] On the other hand, the blood picture in aplastic and haemolytic anaemias may sometimes be megalocytic, but the bone-marrow is not megaloblastic and treatment by the pernicious anaemia (P.A.) factor is ineffective. In accordance with Castle's hypothesis of extrinsic and intrinsic factors the megalocytic deficiency anaemias can be further subdivided into those which are due to a defect in the diet, the nutritional macrocytic anaemias, and those which are due to a disturbance in the digestion, of which Addisonian pernicious anaemia and sprue are the chief examples. This distinction must not be pressed too far, for dietary deficiencies have a way of impairing digestion, as has been only too sadly verified in recent experiences of starvation in Europe. The laboratory data in nutritional macrocytic anaemia differ in three ways from those commonly found in pernicious anaemia: (1) hydrochloric acid is usually present in the gastric juice; (2) the serum bilirubin is within normal limits; and (3) the serum iron is usually not elevated.[4]

Nutritional macrocytic anaemia is so prevalent that it might have been expected that the enormous number of cases would have enabled us to work out the chemistry of the extrinsic factor and the P.A. principle. Unfortunately this has not yet happened. It is difficult to carry out controlled therapeutic trials in tropical and subtropical countries owing to the poverty of hospital and laboratory resources and the temperament of the patients. Moreover, like most dietary defects, nutritional macrocytic anaemia is often complicated by multiple deficiencies, and by infections and parasitic infestations. A deficiency of iron so frequently occurs at the same time that the useful name "dimorphic anaemia" has been introduced.[5] Haemolysis may be provoked by concomitant malaria, and pregnancy is a common cause for the final breakdown. Nutritional macrocytic anaemia is also more often resistant to treatment than Addisonian pernicious anaemia, particularly to treatment by highly purified extracts of liver. This has led to the suggestion that whole liver and proteolysed extracts of liver contain active principles which are lost during purification.[6] It is possible, however, that the difference is merely one of dosage; with purified intramuscular extracts it is unusual to give more than 0.2 g. of liver solids a day, while with proteolysed extract of liver the dosage is 50 g. a day. Moreover, resistance is sometimes due to recognizable inhibitory influences such as pregnancy or infection, and it is not in itself a strong argument for a chemical difference in the nature of the haematinic principles which are lacking in pernicious anaemia and nutritional macrocytic anaemia. Nevertheless, all these complications make research on nutritional macrocytic anaemia a difficult and tedious business.

Much confusion has existed about the pathogenesis of the macrocytic anaemia of pellagra and other forms of vitamin-B deficiency. The incidence of this anaemia varies widely in different parts of the world and in the different types of avitaminosis B. In Egypt, Salah[7] found no macrocytic anaemia among 118 pellagrins. In endemic pellagrous areas of the United States, Huck[8] and Turner[9] found anaemia uncommon, and, when present, usually hypochromic and microcytic in character. Among the so-called alcoholic pellagrins, Spies and Chinn[10] found macrocytic anaemia to be relatively common. The anaemia has been variously ascribed to lack of a specific B factor, deficiency of Castle's extrinsic factor, and loss of the intrinsic factor. Since the B complex and the extrinsic factor are often closely associated in nature, and since pellagrous diets are frequently deficient in both, it has hitherto been difficult to determine which, if either, plays the decisive part in the production of the anaemia. The frequency of absolute achlorhydria in pellagra has lent support to the view that the anaemia results from absence of the intrinsic factor. Nevertheless, little information has been available about the intrinsic factor of the gastric juice in this disease; it has been demonstrated in a few instances, but only in patients in whom there has been no significant anaemia. Furthermore, the incidence of achlorhydria appears to vary; Sodeman[11] found it in 55 out of 77 pellagrins, whereas Moore, Vilter, Minnich, and Spies[4] demonstrated free HCl in the gastric juice at one or another time in as many as 21 out of 25 pellagrous patients.

The question of the pathogenesis of this anaemia has now been decisively answered by Moore and his co-workers. They have studied 25 patients with pellagra in whom glossitis, dermatitis, and peripheral neuritis were associated with a severe macrocytic anaemia. The diets of these patients had for many years been grossly deficient in all the members of the B complex and in animal protein. The anaemia was cytologically indistinguishable from Addisonian anaemia, but in 21 of the 25 patients free hydrochloric acid was found in the gastric juice. The American workers were able to demonstrate the presence of intrinsic factor in the gastric juice of two of their cases by the production of a reticulocyte response when patients with Addisonian anaemia were treated with a mixture of

[1] Davidson, L. S. P., Davis, L. J., and Innes, J., *Quart. J. Med.*, 1942, **11**, 19.
[2] Callender, S. T. E., ibid., 1944, **13**, 75.
[3] Napier, L. E., *Lancet*, 1936, **2**, 679.
[4] Moore, C. V., Vilter, R., Minnich, V., and Spies, T. D., *J. Lab. clin. Med.*, 1944, **29**, 1226.
[5] Trowell, H. C., *Trans. roy. Soc. trop. Med. Hyg.*, 1942, **36**, 151.
[6] Davis, L. J., and Davidson, L. S. P., *Quart. J. Med.*, 1944, **13**, 53.
[7] Salah, M., *Trans. roy. Soc. trop. Med. Hyg.*, 1935, **29**, 299.
[8] Huck, J. G., *Johns Hopk. Hosp. Bull.*, 1923, **34**, 157.
[9] Turner, R. H., *Amer. J. med. Sci.*, 1933, **185**, 381.
[10] Spies, T. D., and Chinn, A. B., *J. clin. Invest.*, 1935, **14**, 941.
[11] Sodeman, W. A., *Amer. J. med. Sci.*, 1938, **196**, 122.

pellagrous gastric juice and extract of raw beef muscle. Having shown in this way that the anaemia was not due to an intrinsic defect, they then proceeded to study the reticulocyte response in the pellagrins while they were kept on a standard diet deficient in both the B complex and Castle's extrinsic factor, in order to determine the specific nutritional deficiency responsible for the anaemia. After a control period on the diet, massive oral and parenteral therapy with all the known B vitamins was tried, and though the clinical manifestations of avitaminosis were relieved there was no change in the reticulocyte count. Nicotinic acid, thiamine, riboflavin, calcium pantothenate, pyridoxine, inositol, para-aminobenzoic acid, and choline had no therapeutic value in correcting the anaemia, even though they were given in combination both orally and parenterally. Administration of highly purified liver extracts, however, caused prompt haematological and clinical improvement. When extract of raw beef muscle was ingested daily a suboptimal reticulocyte response occurred which was followed by a rise in the red cell count and clinical remission. In one of these patients there was a further small rise in the reticulocytes when a mixture of normal human gastric juice and beef extract was ingested, and again an increase in reticulocytes followed by acceleration of the rise in red cell count when purified liver extract was given parenterally. All the patients, in whom the reticulocyte response was suboptimal when beef extract was ingested, exhibited a second reticulocyte response after intramuscular injection of purified liver extract.

Moore and his colleagues conclude that none of the B vitamins they used can act as the extrinsic factor, and that the macrocytic anaemia of pellagra depends on a prolonged deficiency of Castle's extrinsic factor in the diet. This is associated in many instances with poor absorption from the gastro-intestinal tract and in some cases with inadequate production of intrinsic factor by the gastric mucosa. Most of the patients were observed for two or three years, and, as would be expected, the few who corrected their faulty dietary habits remained well without further liver therapy. These findings provide an explanation of the variable incidence of macrocytic anaemia in pellagra. Though the sources of the B complex and the extrinsic factor are frequently identical, deficient dietaries may be lacking in one or other as well as in both. A high incidence of macrocytic anaemia unaccompanied by avitaminosis has recently been reported in this *Journal* among Indian troops on an exclusively vegetarian diet,[12] whereas it is probable that the diets of pellagrins in Egypt and the endemic areas of the United States, where the incidence of macrocytic anaemia is low, contain adequate amounts of the extrinsic factor though deficient in the B complex.

Finally, we must emphasize that this excellent American study is a challenge to British haematology. The British Empire is the world's largest reservoir of nutritional macrocytic anaemia, and it is painful that English haematologists should be expending their skill on the minutiae of their craft at home when such important work awaits them in the field. A cheap remedy for nutritional macrocytic anaemia would greatly enhance the vigour of tropical and subtropical populations. To discover it there are some obvious immediate steps. The first is the creation of a research centre or centres in a situation where large numbers of patients with nutritional macrocytic anaemia can be attracted and treated. The second is the fractionation of beef muscle by the same kind of technique as the Harvard group[13] has developed for plasma and the study of the separate fractions to locate and isolate the extrinsic factor. The third is the purification and characterization of the liver principle. These problems have hung in the wind for the last ten years, largely as a result of the war and the impossibility of sending research teams over-seas, but the war itself has shown how important the problem of nutritional macrocytic anaemia is, and how urgent, therefore, it is to create an organization to deal with it.

[12] Taylor, G. F., and Chhuttani, P. N., *British Medical Journal*, 1945, **1**, 800.

[13] Cohn, E. J., *et al.*, *J. clin. Invest.*, 1944, **23**, 417 *et seq.*

ARTIFICIAL LIMBS

The recent White Paper[14] setting out the report of the Departmental Committee appointed by the former Minister of Pensions, Sir Walter Womersley, gives a good survey of the fitting and supply of artificial limbs. It is a carefully compiled document presenting information of value to all concerned with the welfare of those who have undergone amputation. Previous reports have necessarily dealt with Service cases only, but now that the Ministry's limb-fitting organization is employed by other Government Departments, and by other bodies who provide artificial limbs, it affords a useful review with some welcome recommendations.

At the end of the 1914–18 war artificial limbs were made of varying designs by many firms. With the large number of Service cases there was no one firm capable of supplying all the prostheses required. As the various types were tried it became manifest which designs were better suited for the use and comfort of the patient. Ultimately it could be decided which were the essential features to be incorporated in a uniformly constructed and comfortable prosthesis for each site of amputation. It appears from the evidence of witnesses representing large numbers of pensioners and from reports received (as set out in Appendix 1) that the present artificial leg is of sound construction and design, giving general satisfaction. Reviewing the recommendations set out there still appears room for improvement in some types of leg, and a like conclusion seems to have been reached regarding the artificial arm. One might well think that it is against progress to eliminate competition by placing the contract for the manufacture and supply of limbs with one firm. The White Paper declares, however, that when new designs of legs and arms and of appliances are submitted and proved to be of value they will be incorporated to improve the prostheses. A standing advisory committee has been specially appointed to investigate all proposals submitted and to have any new development critically examined and tested. This procedure should ensure further progress and enable all types of patients to have their requirements specifically catered for.

[14] *Artificial Limbs.* Ministry of Pensions, 1945. H.M. Stationery Office. Price 4d.

Whereas before the present war the Ministry of Pensions mainly supplied only ex-Service men with prostheses, there are now many civilians, including women and children, who have been injured by enemy action to be considered. The Ministry of Education also uses the Ministry of Pensions' organization to provide school-children with such prostheses as are required for congenital and other cases. This new branch of the work certainly calls for more individual care from the surgeon and the fitter, as indicated in the report. It is to be hoped that some of the committee's recommendations will soon be put into effect. Individual attention by one surgeon and the same fitter is a major factor in the rehabilitation of the person who has lost a limb. The surgeon responsible for examining a patient, advising the correct treatment of the stump before limb-fitting, and ultimately specifying the proper type of limb for the site of amputation needs to be a man who can inspire the patient's confidence. He can, with the co-operation of the fitter and repeated examination of the patient, ensure a successful fitting of the prosthesis. Now that limb-fitting is regarded as a specialized practice the recommendations in paras. 21 and 22 are of primary importance: there is need for skilled surgeons with both medical and technical knowledge who will work closely with the limb-fitter. The Ministry's policy in employing surgeons for this work will no doubt be copied in other countries where so far it has been handled only by the limb-maker.

Careful records of all relevant data concerning patients and their full subsequent limb-fitting history should be published for the guidance of those dealing with the limbless in all countries. This would very often be of inestimable value to surgeons before the actual amputation is performed. Are the committee's recommendations that a patient might have the limb on trial in the rough stage being seriously considered and carried out? There appears to be a controversy on the question whether the patient should have a wood or a metal limb for a below-knee amputation site: the advantages and disadvantages of each might well be published for guidance. Artificial arms need a specially detailed study with regard both to the arm and to all appliances used. The replacement of the natural hand by anything approaching it presents a very difficult problem. It is to be hoped, however, that no effort will be spared to obtain useful industrial employment for the man who has lost an arm—something which needs more skill than the job of messenger or lift-attendant.

The methods used for re-educating and training those who have lost a limb are clearly set out and fully confirm what has already been published in many journals upon rehabilitation generally. As a result of the committee's recommendations, together with the suggested technical improvements summarized in Appendix 4, and any other suggestions which may be submitted at various times, we may hope that the experience of the Ministry of Pensions will further benefit all people throughout the world who have undergone amputation. The report is a very fair and useful criticism of the work of the limb-fitting organization of the Ministry, whose staff have shown great forethought in establishing a system capable of being extended to cover the requirements of Service and civilian cases from the outbreak of the war, as well as supplying artificial limbs to patients from Allied countries, and also maintaining the system for patients injured in the last war for whom it was originally devised.

PERNICIOUS ANAEMIA AND CARCINOMA OF THE STOMACH

Interest in the coexistence of pernicious anaemia and carcinoma of the stomach dates back to 1876, when Quincke is said to have called attention to such a case. It has grown as the diagnosis of pernicious anaemia has become more accurate and as patients with pernicious anaemia have been kept alive by treatment with liver. A gastric tumour has been discovered as late as 17 years after the diagnosis of pernicious anaemia, and it seems clear from the Mayo Clinic[1] statistics that the concurrence of both benign and malignant tumours of the stomach with pernicious anaemia has increased since the anaemia has been brought under control. There is nothing to suggest that the liver principle is carcinogenic; on the contrary, gastroscopic and microscopical examinations of the gastric mucosa suggest that liver extract tends to arrest inflammatory and degenerative changes in the stomach as in the tongue. The extensive literature has been reviewed recently by Kaplan and Rigler,[2] who have also analysed 43,021 consecutive post-mortem reports in the Department of Pathology of the University of Minnesota from this point of view. Their task has been made harder by the fact that, although pernicious anaemia is more easily diagnosed in life than after death, there has been a tendency to regard any severe anaemia occurring in association with carcinoma of the stomach as due to the carcinoma and not to study it further. It seems doubtful whether a carcinoma of the stomach could produce pernicious anaemia by its action on the gastric mucosa, for complete removal of the stomach in animals and man is rarely followed by the development of pernicious anaemia, and it is more probable that when the two diseases occur together it is because both are the result of similar hereditary or acquired characteristics of the gastric mucosa. In their own series Kaplan and Rigler found that there were 36 cases of known association of pernicious anaemia and carcinoma of the stomach among 293 cases of pernicious anaemia. This represents an incidence of gastric carcinoma in 12.3% of all cases of pernicious anaemia coming to necropsy. The incidence of gastric carcinoma among all other necropsied individuals of comparable age was slightly less than 4%—less than one-third of that found in individuals with pernicious anaemia. Statistically there was decisive evidence for an aetiological relation between carcinoma of the stomach and pernicious anaemia.

The conclusion that Kaplan and Rigler drew from this study was that patients with pernicious anaemia should be submitted to clinical and *x*-ray examination at regular intervals to secure early detection of new growths of the stomach. This procedure would provide an opportunity for the study of the earliest signs and symptoms of carcinoma of the stomach and for the analysis of the hereditary and constitutional factors at work. Moreover, it would be more profitable and practicable a method of early diagnosis of carcinoma of the stomach than the routine *x*-ray examination of all individuals over 50, as less than 1 in 1,000 people in these groups will be found to have carcinoma of the stomach at any one survey. Admittedly not more than 5% of all patients with carcinoma of the stomach will have suffered from pernicious anaemia, but

[1] Olson, S. W., and Heck, F. J., *Proc. Mayo Clin.*, 1945, **20**, 74.
[2] *Amer. J. med. Sci.*, 1945, **209**, 339.

study of pernicious anaemia may enable us one day to pick out the individuals with precancerous lesions of the stomach. Rigler, Kaplan, and Fink[3] have therefore kept 211 patients with pernicious anaemia under observation, examining the stomach usually twice a year but occasionally at longer intervals. The maximum number of *x*-ray examinations per patient so far is eight. Already carcinoma of the stomach has been found in 8% of the patients and benign polyps in 7%. These figures seem high, but the presumption is that they will finally rise higher, to the level of the 12% found in the post-mortem room. The detection of benign polyps is of cardinal importance, as these tumours so often become malignant. The characteristic malignant growth in the stomach in pernicious anaemia is a bulky polypoid tumour, and the sequence appears to be atrophy of the gastric mucosa, benign polyp, and finally adenocarcinoma. The problem of dealing with these benign polyps in the individual patient is difficult. If the lesion is not more than 4 mm. in diameter Rigler and his colleagues prefer to watch and await developments. When the tumour is larger, resection is advised, even though it seems benign. These American studies are very convincing, and it is desirable that regular clinical and *x*-ray examinations of the stomach in pernicious anaemia should become the customary practice.

CAFFEINE AND PEPTIC ULCER

Already in 1904 Allard[4] observed the production of acute gastric erosion and haemorrhage, in man and dog, after the ingestion of synthetic theophylline, and numerous later workers have confirmed that drugs of the caffeine series, administered orally or by injection, may induce acute gastric erosion within a few hours. Roth and Ivy,[5] who have shown previously that the development of the caffeine-induced ulcer is associated with increased secretion of acid and pepsin, and that it can be accelerated by alternate administration of caffeine and histamine, have now[6] studied sections of the gastric mucosa of the cat excised serially by a special technique at intervals of 15 minutes after the slow intravenous injection of 250 mg. caffeine sodium benzoate. They describe a regular sequence of changes in the mucosa: vasodilatation and engorgement followed by vascular stasis, local anoxia, increased capillary permeability, transudation, extravasation of blood elements, and proceeding finally to decreased cell nutrition. Roth and Ivy are accordingly of the opinion that the acute caffeine-induced ulcers arise by the digestive effect exercised by pepsin and hydrochloric acid, formed in excess, upon a gastric mucosa specifically devitalized by circulating caffeine. They add that the pharmacodynamic action of caffeine upon the stomach may or may not be partly or wholly dependent upon its excitatory action on the central nervous system.

Merendino and his fellow-workers[7] have examined the effect of daily intramuscular injection of caffeine alkaloid in a beeswax medium in guinea-pigs and cats. Four out of 10 guinea-pigs and 11 out of 26 cats developed typical punched-out ulcers. In dogs with prepared gastric pouches it was shown that the subcutaneous injection of 1,200 mg. of aqueous caffeine alkaloid, or the daily intramuscular injection of 2,500 mg. of caffeine alkaloid in beeswax, increased the volume and acidity of gastric secretion. This effect persisted even after division of the vagus, and is presumed to be due to the direct action of caffeine upon the gastric mucosa. This experimental work is not without direct and immediate application to man. Merendino has verified that two cupfuls of coffee taken by mouth or by stomach tube increase the volume and acidity of gastric secretion, and that the increase is most dramatic if the coffee is drunk cold and black. Judd[8] in 1942 reported the perforation of a peptic ulcer in a young man, with no previous experience of dyspepsia, after the ingestion of 150 bottles of coca-cola during a five-day heat-wave. Another patient, whose duodenal ulcer proved highly resistant to treatment, proved to be a coca-cola addict. The relation of peptic ulcer to caffeine in these two clinical examples may not be entirely causal, but the experimental work brought together in the papers cited is at least an adequate justification for eliminating caffeine-containing beverages from the diet of ulcer patients.

A NEW REACTION TO EMOTION

Our knowledge of the physiological changes that occur in the body during emotion has hitherto been confined to the increased activity of the sympathetic system, which reinforces its own effects by liberating adrenaline from the suprarenal gland. During fear or anger there is a rise of blood pressure, with increased rate and force of heart-beat, inhibition of the intestines, and pallor of the skin—all changes recognized to help the body to defend itself, and produced by the agency of the sympathetic system. Recent work by E. B. Verney and his colleagues has now brought to light another mechanism which is set in action by emotion and which again involves the discharge of a hormone into the blood stream. Working in the Pharmacological Laboratory in Cambridge on the release from the pituitary posterior lobe of the hormone which controls the loss of water through the kidney, Theobald and Verney[9] observed that "stimuli ranging in severity from shaving the skin to lumbar puncture inhibit water diuresis for varying periods of time." Rydin and Verney[10] later found that diuresis caused in a dog by giving water was also inhibited by a powerful auditory stimulus such as the sounding of a motor-car horn, or by an electrical stimulus applied to the skin.

It seemed very likely that these inhibitory effects were due to the sympathetic. Verney has taken the greatest care to demonstrate that the sympathetic plays no part in this inhibition. Of the series of brilliant researches which form an unbreakable chain of evidence it is possible to mention only one or two here. To demonstrate that the change in the kidney which inhibited diuresis was produced by a hormone carried in the blood, Theobald and Verney[9] prepared a dog in which they achieved the apparently impossible aim of separating one kidney from all tissue connexion with the rest of the body, and accomplished this without interruption of the blood flow through the kidney for more than "a fraction of a second." They were able to show that the kidney in these circumstances functioned normally; diuresis followed when water was given to the dog by mouth. This diuresis was inhibited by sensory stimulation of the skin of the dog's back. The inhibition must therefore have been hormonal; it was not due to adrenaline, because adrenaline did not exert an antidiuretic effect of the kind which was observed. The final link in the chain of evidence was obtained by O'Connor and Verney,[11] who demonstrated that the antidiuretic effect of sensory stimulation was reduced to negligible proportions by removal of the greater part of the

[3] *J. Amer. med. Ass.*, 1945, **128**, 426.
[4] *Dtsch. Arch. klin. Med.*, 1904, **80**, 510.
[5] *Amer. J. Physiol.*, 1944, **141**, 454.
[6] *Surgery*, 1945, **17**, 644.
[7] Ibid., 1945, **17**, 650.
[8] *Bull. Amer. Coll. Surg.*, 1943, **28**, 46.
[9] *J. Physiol.*, 1935, **83**, 341.
[10] *Quart. J. exp. Physiol.*, 1938, **27**, 343.
[11] Ibid., 1942, **31**, 393.

posterior lobe of the pituitary gland. Verney has thus established the existence of a new reflex pathway which is followed by powerful sensory stimuli. Probably the stimulation reaches the supra-optic nucleus in the hypothalamus, and the impulses which travel to the posterior lobe are relayed from it. The discovery prompts further questions. What other impulses are relayed from this region of the brain in response to such stimuli? Is it only the antidiuretic hormone which is released from the posterior lobe?

We would like to conclude this outline by referring to the exceptional surgical skill which has characterized this work. A second example in addition to the one already given is that Lockett, O'Connor, and Verney[12] prepared dogs with an exteriorized renal artery. One kidney is brought to lie directly under the skin and the renal artery to this kidney is surrounded by a cuff of skin. Thus it is possible to pass a finger along the dog's back and under the renal artery. The effect on water diuresis of occlusion of the renal artery for any length of time can then be observed. Dogs thus prepared remain in good health indefinitely.

SPROUTING LEGUMES

The soaked pea, the subject of seed germination, has been studied from many aspects, and new facts about this phenomenon are coming to light. Among them the rapid development of vitamins by sprouting legumes must be considered not only interesting but also of practical importance. As early as 1912 Fürst had suggested that in military operations the use of germinated seeds might prevent scurvy. Chick and Delf[13] in 1919 showed that, while dried peas and lentils were useless as a source of vitamin C, on sprouting they became valuable antiscorbutics. Other investigators confirmed these findings, and it was also observed that there was a significant increase in the amount of the B vitamins: in particular, riboflavin and nicotinic acid have been found to increase on germination of legumes, although the amount of B_1 appears to remain unchanged. The importance of applying this knowledge in time of scarcity is obvious, especially when it is realized that, except for their vitamin content, dried legumes have high nutritional value and are also compact and light for transport. In Australia their value became evident in the early stages of the Pacific war, and the Australian Army, working through the Council for Scientific and Industrial Research and the facilities of Adelaide University,[14] issued routine instructions for the proper sprouting of the blue boiling pea (*Pisum sativum*). Although this pea has been found to be one of the most satisfactory legumes for the required purpose, green gram (*Phaseolus mungo*) and soya bean are also frequently quoted. Haricot and navy beans (*Phaseolus vulgaris*) cannot suitably be used, as the rate of germination is so slow that they tend to putrefy before sprouting.[15]

The method usually recommended is a preliminary soaking in water for about 8 to 18 hours in a large burlap bag, or, on a household scale, in a colander. The temperature at this stage is important, as if too high it will induce putrefaction, and if too low it will inhibit germination. About 25° C. is considered a satisfactory temperature. At the end of the soaking period the legumes are drained and germination is allowed to proceed for about three days after commencement of the preliminary soaking or until the shoots are about 2 in. long. Occasional immersion in water, followed by draining, may be necessary over this period. Cooking is best carried out by the conservative method,[16] using a small quantity of water in a covered saucepan. A recent correspondent to this *Journal*[17] pointed out that bean sprouts have been eaten by the Chinese from time immemorial. A survey[18] of the vitamin content of germinated legumes carried out by French and his colleagues at Washington, D.C., gives the following figures in mg. per 100 g. of sprouted pea: ascorbic acid, 25.0; riboflavin, 0.35; nicotinic acid, 1.40; thiamine, 0.24. According to the figures of Lugg and Weller[19] the loss of vitamins during cooking would appear to be about a third of the initial values. These results suggest that the retention of the vitamins may be of the same order as found when the more generally accepted vegetables are cooked. Any food which is recommended for its nutritional value must also conform to accepted standards of palatability. The opinion of French and his colleagues that the final product is highly acceptable as a palatable food as well as an accessory source of vitamins is therefore to be regarded as a further important feature of the phenomenon of the sprouting legume.

[12] *Quart. J. exp. Physiol.*, 1942, **31**, 333.
[13] *Biochem. J.*, 1919, **13**, 199.
[14] Council for Scientific and Industrial Research, *The Production of Antiscorbutic by Germinating Peas*, 1942.
[15] Lugg and Weller, *Austral. J. exp. Biol. med. Sci.*, 1943, **21**, 111.
[16] *British Medical Journal*, 1944, **2**, 806.
[17] Gee-Tseh Mar, ibid., 1945, **1**, 284.
[18] French *et al.*, *J. Nutrit.*, 1944, **28**, 63.
[19] *Austral. J. exp. Biol. med. Sci.*, 1943, **21**, 211.

UNDULANT FEVER IN THE TRANSVAAL

The annual report of the medical officer of health for Pretoria for 1943–4 is signed by Dr. T. Lötter, who has been acting M.O.H. during Dr. H. Nelson's absence on active service. Besides much information, largely statistical, it includes a note on the menace of undulant fever by Dr. Adrianus Pijper, pathologist to the Pretoria Municipality. Of the three microbes which cause different diseases of the same type *Br. melitensis* and *Br. abortus* are of importance to South Africa. Dr. Pijper's contribution is confined to what he has come across in the way of blood tests done for the diagnosis of undulant fever during the period 1939 to the end of the first quarter of 1944. In a little over five years he found 102 persons who gave a positive test, though only a fraction of these cases were officially notified. Making every allowance for uncertain factors, he concludes that there must be much more of this kind of infectious disease about than is usually thought, and that the incidence in and around Pretoria is certainly not decreasing but rather the reverse. He has good reason to believe that a number of cases completely escape detection and that Charles Nicolle's warning, that undulant fever was a disease of the future and would become more and more prevalent, seems justified by the course that events are taking. The subject is being actively pursued by the veterinary workers at Onderstepoort in so far as animals are concerned, but as usual the medical side is lagging behind. Dr. Pijper points out that it is not laboratory research on the human side that is needed in the first instance: general practitioner and physician specialist should pay more attention to the subject. At the moment both the laboratory worker and the public health official are very much in the dark as to where they should begin. It is for the G.P. and the physician to give them a lead.

Dr. A. J. Orenstein has been promoted major-general, the first medical man in South Africa ever to reach that rank. He has now retired from the South African Army and gone back to his post as chief medical officer of the Rand Gold Mines. Dr. Orenstein has received the C.B. and the C.B.E. during this war, and in the last war the C.M.G.

TRAINING NURSES FOR THE COLONIES

A RUSHCLIFFE COMMITTEE REPORT

A committee under the chairmanship of Lord Rushcliffe was set up by the Colonial Secretary in 1943 to examine the question of the training of nurses for the Colonies and has lately reported.[1] Among its 17 members the committee included 6 doctors—namely, Dr. Mary G. Blacklock, Dr. W. H. Kauntze, Dr. H. M. C. Macaulay, Dr. H. A. Moody, Mr. Arnold Walker, and Dr. A. G. H. Smart, but Dr. Smart left for an U.N.R.R.A. appointment before the report was drafted.

The committee begins its report with a consideration of medical policy in the Colonies. The medical services in the Colonies are now generally regarded as part of a co-operative effort to improve the well-being of the community, and it is accepted that there should be the closest co-operation not only between the Government medical departments and the services provided by the local authorities, commercial organizations, and voluntary bodies, but also between medical workers on the one side and the staffs of the administrative service and of the education, agriculture, and veterinary services on the other. One point made is that hospital services in most Colonial territories can at present be available only to a small proportion of the people who are suffering from disease or its results. On the other hand, in tropical territories at any rate, much sickness is preventable. Thus it would appear that the primary aim of medical workers in such territories should be to improve health standards and to control transmission of disease.

In fulfilment of this medical policy nursing services have clearly an essential part to play. It is within these services especially that scope is likely to be found for the greatly increased employment of women as agents of health and welfare; and the expansion of health education and the welfare of mothers and children will largely depend on the work of nurses.

Standards of Colonial Nursing

In each Colonial territory or group of territories, in the committee's view, there should be set up machinery for the control of standards of nursing by means comparable with those adopted by the General Nursing Council for England and Wales and the Central Midwives Board. It is recommended that all trained nurses should be registered, and that the control of such registration, of nursing education, and of discipline should be in the hands of a Nursing Council set up in each territory or group of territories under a Nurses Registration Ordinance. A Midwives Council should also be established, though in some areas the two might form a joint body.

The committee deals first with locally recruited nurses. These should be trained in schools in their own territories, where the standard should be such as to render Colonial certificates acceptable to the General Nursing Council. After qualifying in these schools, nurses showing aptitude in administration or in special departments in their own territories should be given every facility for post-registration training in the United Kingdom or elsewhere. The "block" system of training is advocated under which the student is relieved of nursing duties in hospital for varying periods in each year and during those periods she receives her theoretical training. It is recommended that the complete period of training required for certificate should be four years, the first three years to be devoted to basic training, and the last year to any special branch.

Midwifery Service

The evidence given to the committee emphasized strongly the need for efficient midwifery service in the Colonies. The committee considers that the minimum period of instruction to qualify for registration as a practising midwife should be at least two years for those without a nurse's training and one year for nurses who have completed the basic three-year course. The aim of Colonial Governments ought to be to improve the training given in midwifery until it is comparable with that given in the United Kingdom, and the curriculum should stress health teaching in relation to pregnancy and the bearing of maternity work on other community welfare services.

It must not be supposed that the recommendations relate only to areas where education has reached school certificate level. The backwardness of girls' education is not in itself a valid reason for delaying the establishment of a nurses' training school, although the course of training will require modification. The teaching must be in a more simplified form; and, as a temporary expedient, in territories where two or more levels of general education exist among the population it is proposed that there should be two grades of certificates for nursing, the second to include the same subjects as the first but with a smaller content, and the precepts to be inculcated by practical demonstration rather than by lecture.

As for the training of nurses in the United Kingdom and Dominions for work in the Colonies, it is suggested that candidates should be registered in the general part of the General Nursing Council's register. Except for a few specified posts, candidates should also be State-certified midwives. Before appointment to the service they should have had at least one year's hospital experience after State registration. Sister tutors and midwifery teachers should be nursing sisters who already had had some Colonial experience. All candidates before taking up their appointment should be given a special course of instruction designed to equip them adequately for the Colonial Service, and they should set themselves to learn the principal language of the territory.

On the question of recruitment and conditions of service, it is suggested that the Colonial Governments should provide full information concerning local conditions and duties, and that more effective publicity might be given in the schools to the possibilities of a nursing career in the Colonies. Conditions of service should be at least as favourable, having regard to local purchasing power and taxation, as those already recommended by the Rushcliffe Committee for nurses in this country, pension arrangements should be not less attractive, and provision should be made for transfer of nurses between this country and the Colonies, in either direction, without loss of pension rights.

[1] Cmd. 6672. H.M. Stationery Office. 1s.

A PIONEER IN BLOOD TRANSFUSION

A fund the object of which is to raise a minimum of £10,000 for the development of blood transfusion and research in connexion therewith has been inaugurated in memory of Percy Lane Oliver, a pioneer who in 1921 brought together the first small group of blood donors and devoted his life to the blood transfusion service. Oliver was secretary of the Camberwell Branch of the British Red Cross Society when a message was received from King's College Hospital, which was anxious to find someone willing to give a pint of blood to save a dying patient. He called his associates together and persuaded them to leave in a body for the hospital as volunteers. The blood of each was tested, one of them was chosen, and the life was saved. Thereafter Oliver formed a small society of men and women who agreed to submit to blood tests and to "stand by" for any hospital call; this expanded into the London Blood Transfusion Service, and eventually was taken over by the British Red Cross Society. By the beginning of the recent war there had been recruited in London alone more than 3,000 donors, giving between them 10,000 blood transfusions a year. Oliver, who died in 1944, devoted his life to this organization. A committee has been formed under the presidency of Dowager Lady Ampthill, with Air Vice-Marshal Sir David Munro and Mr. Victor Riddell, F.R.C.S., among its members, to perpetuate his memory by raising a fund for research into matters relevant to blood transfusion, for the establishment and maintenance of voluntary blood donors' services, and for the giving of lectures and issue of literature. The address of the Oliver Memorial Fund is 18, Wilton Crescent, S.W.1.

MEDICAL STUDENTS' CONFERENCE

A clinical conference under the auspices of the British Medical Students' Association was held at the end of last month in the Leeds University Medical School; students from the Universities of Durham, Liverpool, Manchester, Birmingham, and Sheffield, and from London hospitals attended. Mr. George Armitage, F.R.C.S., honorary surgeon to the General Infirmary at Leeds, gave the inaugural lecture on "The Personality of a Hospital."

Mr. Armitage said that in the history of the Leeds General Infirmary the personality of the staff had always impressed itself upon the institution. He mentioned William Hey primus, pupil of the great John Hunter and one of the first four surgeons to be appointed to the Infirmary in 1767; Samuel Smith, who lectured in the medical school from 1831 to 1858; John Heaton, Pridgin Teale, Sir Clifford Allbutt, McGill, and in later years Lord Moynihan. There was also the influence of the medical student. The student body added that flavour which, to a hospital, meant life. A hospital was safeguarded, so far as its patients were concerned, if its workers came under a constant fire of criticism from watchful students. The personality of a hospital seemed to him its greatest asset, and this thought must quicken the sense of responsibility of all working in it and for it.

Col. Malcolm Stoddart-Scott, M.D. (M.P. for the Otley and Pudsey Division of the West Riding) gave a general lecture in which he discussed the moral and sociological problems connected with the declining birth rate.

OPENING OF MEDICAL SCHOOLS

WESTMINSTER HOSPITAL

Archbishop of Canterbury on Doctors and Priests

The inaugural address at Westminster Hospital Medical School was given on Oct. 1 by the Archbishop of Canterbury, Dr. Geoffrey Fisher. With him on the platform were the Lord Chancellor (Lord Jowitt), Lord Horder, Mr. H. S. Souttar (President of the British Medical Association), Lord Wigram (President of Westminster Hospital), Mr. Eardley Holland (President of the Royal College of Obstetricians and Gynaecologists), and Air Marshal Sir Harold Whittingham (Director-General, R.A.F.M.S.).

Dr. FISHER prefaced his address by making two general observations. The greatest need of this generation, he said, was an accepted doctrine of the meaning and purpose of life by which could be controlled the multiplicity of ideas, desires, and passions which poured incessantly over human activities. For a long time past two processes had continued side by side—the fragmentation of truth and the frustration of life. Fragmentation of truth had occurred partly because the field of human knowledge had extended so vastly that no man could cover more than a fragment of it, and the idea of truth as governing the whole disappeared; with this had come—probably as an effect following the cause—a sense of frustration. His second observation was that the remedy could be found only in a truth and purpose which was greater than man, not created by him, but governing and controlling him, to which he would give the name of religion.

The medical profession (Dr. Fisher continued) had its scientific, social, and personal aspects, and he desired to say a word on each. Its scientific aspect was the exciting and enthralling pursuit of truth, the acquisition of exact knowledge by experiment and observation. Scientific truth was discovered by man, not created by him. From the beginning of time penicillin and the atomic bomb were potentialities; man did not put them into the universe, and this compelled the reflection, How did the universe become such an ingenious thing as it was—by chance or by design?

Pure science was concerned only with truth and error, but as pure science it existed only in abstraction. As soon as it was applied and used, it inevitably became involved in another contrast—good and evil; that is to say, in moral issues. Medical science touched moral problems at a hundred points.

"We laymen are liable to get frightened lest science by degrees deprive us of any right to exist. We long ago handed over our bodies to the medical profession, but our souls have now gone with them, and the psychologist tells us ghastly things about them—for example, that we do not exist, save as a series of reactions. It will not do. Man remains essentially himself in spite of all the things that science may find about the workings of his machinery."

The Key Position

Medical science, said the Archbishop, was a social science. It was the bounden duty of medical science to do its utmost for society, and of society to see that all the resources of medical science were freely open to all citizens. It was rather easy to get mesmerized by the word "social." It led one to think of men in the lump, and of health and disease in the lump, which was perhaps necessary for the purpose of statistics and organization, but mass thinking was always dangerous. If the individual was left out of sight society became a tyranny. The unit of society was the family, and the key position in the medical profession was the family doctor. Whatever specialization was otherwise required, the whole thing revolved around him. Here the speaker touched on the problems of marriage and sex, asking whether medical students were trained to give skilful, understanding, and wise advice on these problems instead of gathering their impressions from casual experience.

Finally he dealt with the personal aspect of medicine.

"You doctors are with us priests in vindicating the value of the individual. Even in our civilized society there are incalculable forces to depress individual values. You in your profession go and serve the individual for what he is, at all costs to yourself, and your justification is in the end to be found only in the divine love repeating itself in human charity. For that reason you are never only doctors, but also priests in the true sense of the word. The doctor above all—except for the priest—must meet his work with this unity of doctrine about life which can give him a settled, wise, and competent manner of handling the problems presented to him. What patients look for is something stable in the doctor who ministers to them. They want to be sure that he has looked at life steadily and has seen it whole, and has in that process gained wisdom, or, as I should call it, the religious outlook."

The Archbishop added that he had asked a son of his, who was a medical student, what he was to say on that occasion, and his son had reminded him of a remark of Dean Inge that doctors on qualifying should be ordained to their ministry as much as priests. That was true, said Dr. Fisher, and he desired to give public notice that if a procession of students just qualified made their way across Lambeth Bridge and assembled in Lambeth Palace Chapel he would be only too glad, not indeed to ordain them, but in a suitable form to commission them for their ministry.

A vote of thanks to the Archbishop was proposed by Air Vice-Marshal STANFORD CADE, and seconded by Dr. R. J. V. PULVERTAFT. The Dean in his report welcomed back from the Forces six members of the teaching staff, but stated that there were eight vacancies to be filled, and the strain on the existing staff must continue until the best candidates were forthcoming, whether now in uniform or not. The Westminster Hospital School of Medicine welcomed and invited women students to join them once again. A number of prizes, medals, and an inauguration cup were presented to successful students, and a vote of thanks was accorded to Mr. A. W. Clowes, chairman of the medical school committee, who presided.

Opening the 104th year of the College of the Pharmaceutical Society of Great Britain on Oct. 3, Mr. J. C. Young, the president, said that in the coming session, and for the first time in the history of the College, the number of graduate and postgraduate students far outnumbered those taking the Ph.C. and C. & D. diplomas. This indicated the trend of pharmaceutical education, which was rapidly passing into the universities. He welcomed this, for the effect on pharmacy must indeed be beneficial. One could wish that all of them, no matter what branch of pharmacy they had decided to take up—whether retail, hospital, or manufacturing—should not be content with the C. & D. but would stay a further year, if at all possible, to take the higher qualification. He hoped also that many would aspire to postgraduate work and apply for one of the scholarships available.

HOSPITAL AND MEDICAL SCHOOL FOR UGANDA

An important step forward in the development of the medical services in East Africa has been taken in Uganda, where plans for the new hospital and medical school at Mulago, Kampala, are being made. A grant of £500,000 is provided for the purpose under the Colonial Development and Welfare Act. The designer is Mr. Rees Phillips, F.R.I.B.A., who was responsible for the big hospital at Carshalton, Surrey, and the new wing of the Brompton Hospital. He spent some weeks in Uganda and interviewed all officers now working in Mulago.

The new hospital to be built will provide accommodation not only for Africans but for Asians and Europeans, and provision will also be made for a large nurses' training centre to accommodate up to 700 nurses. The new medical school is planned to accommodate medical students up to an annual admission rate of 30, and there will also be accommodation for training pharmacists, laboratory assistants, and sanitary inspectors. The wards of the hospital will be small, the largest one holding 16 beds, and there will be a large proportion of single-bed wards. In the African section alone it is planned to provide at least six operating theatres equipped to deal with surgery of every kind.

The Friends Ambulance Unit was formed in 1914 by a group of Quakers. Until 1916 its members served as medical aid men with the British and French Armies on the Western Front. It was reformed in 1939 by some of its earlier members. Although the work in Finland, Norway, Greece, and the Western Desert was in direct line with the tradition of the first unit, it has, since the days of the air attacks on London in the second year of the war, turned increasingly to the relief of the civilian victims of war, famine, and disease. It is now devoted entirely to this work, and 500 of its members are over-seas. A report of work done in Europe and the East in June, July, and August, 1945, has been published from 4, Gordon Square, W.C.1.

Correspondence

Housing and Health

Sir,—You have done well to publish Dr. H. Nelson's paper (Sept. 22, p. 395) as the profession is apt to overlook the close association of disease with poverty, although the facts are plentiful and well authenticated. But this association is partly casual, and we ought to try to distinguish the casual from the causal, as the remedies are different.

In the first place the standard of hygiene is much lower among the poor, and this accounts for a good deal of disease. Fresh air is nearly always lacking, and infants are the greatest sufferers. It is common to see them in their prams with the hood up in the darkest corner of the overheated living-room; very often they are not taken out for days on end in the winter. Professional people (in these days) invariably keep their infants out of doors all day, and it is a fact that their children suffer and die from catarrhal diseases far less frequently than poor infants.

Discipline.—On the whole the wealthier classes discipline their children better (or pay a nurse to do it) than the poorer classes. They enforce early bed, if for no other reason, because after listening to their prattle all day they are glad to get a little peace for themselves in the evening. Many poor people start wrong from birth by keeping their infants downstairs with the lights blazing, the wireless blaring, and everyone smoking until they themselves go to bed; then they wonder why they cannot get their children of 6 to come in from the streets till a late hour. This problem simply does not arise with the rich. *Waste.*—The poor are proverbially wasteful, and one has only to glance at the pig bins, which are nearly always on their sides, to see this. At the height of the siege of Britain I used to see half-loaves of bread which had been thrown away.

Unwise Spending.—It is not uncommon for working men to admit to me to spending 15s. to £1 per week (£40 to £50 per year) on cigarettes. The cinema twice a week is practically a necessity to many families. I do not know what is spent on drink and betting, but the "football pools" are widely patronized. There is no doubt that the standard of living could be appreciably raised by the exercise of reasonable economy, and one does see many families who are economical and are far better equipped as a result. *Neglect.*—Every experienced G.P. will recollect cases where he was called in at the last minute to sign a death certificate for a moribund child when he was in two minds whether to inform the coroner, and others involving a high degree of ignorance and folly. They may not be very common, but they do push up the infant mortality rate, and I have never known or heard of them in the well-to-do. Social pressure is too strong to permit that sort of thing.

Malnutrition.—The first essential in guarding against this is reasonable table discipline. Many children have to be pressed (I do not say coerced) into eating fat or green vegetables, and prevented from eating the wrong things or between meals. The war has probably done good to nutrition by limiting sweets, and it is likely that excess of sugar prevents the absorption of other essential foods. It has also taught us what a lot of food we can provide for ourselves. It requires no great skill or knowledge to keep chickens, and experience shows that they lay perfectly well when fed on potatoes and balancer meal; and their excreta can be used on the compost heap. It is no superhuman task to grow enough vegetables for a household of ten to have greens or roots nearly every day of the year. It is sad to see how many allotments have already been given up, and it is surely not unreasonable to encourage people to help to feed themselves, especially if they are unemployed.

It is impossible within the limits of a letter to touch on remedies, but if a correct diagnosis is made these will often suggest themselves. Suffice it to say that there is a big harvest of health to be reaped without any new discoveries by applying money and ingenuity to judicious educational propaganda.—I am, etc.,

Norwich. Frewen Moor.

Psychiatry in the Army

Sir,—I shall be interested to hear the views of others concerning the part that psychiatry has to play in the disposal of many cases which come under the review of a Service doctor and which are not dealt with by specialists in other branches of medicine. To send a patient to the neuropsychiatrist is frequently the refuge of the diagnostically destitute, the results, in my experience, often being most disappointing. I refer to those cases which present certain well-known features, such as headaches, dizziness, lack of confidence, depression (with or without suicidal tendencies), lack of emotional control, temperamental instability, vague muscular pains, insomnia, bad memory, and multitudinous digestive disorders, coupled with inability to carry out their appointed duties. Having received a clean bill of health from all other specialists they are handed over by the unit medical officer in desperation to the neuropsychiatrist for diagnosis and disposal. The neuropsychiatrist will in most cases extract a typical history, including many, if not all, of the following features: nail-biting, childhood bed-wetting, fear of the dark, anorexia and insomnia, functional impotence, and, in some cases, upset over domestic or Service matters.

The first step on the downward path is now taken. A diagnosis of anxiety state is made, the medical category is lowered, and the patients' oversea service is restricted. Almost without exception on returning to their unit they deteriorate steadily, until, in desperation, the final scene is enacted, and they are invalided out. I contend that this course is unsatisfactory and immoral. The patients' weaknesses, whether real or alleged, are pandered to, and a chronic state of neurotic invalidism is engendered, which makes them a burden to all concerned, including themselves.

A unit medical officer can observe these cases between the time they are told they will be invalided and the date of their actual discharge. What a transformation we now behold! The lame leap for joy, the blind see, and dyspeptics eat large indigestible meals without apparent discomfort. Why this miraculous change? What healing balm has been applied? What unction bestowed? In my opinion these people have, by conscious or unconscious deception, achieved their object. Instead of uniform they will wear civilian clothes; instead of a barrack-hut, the comforts of a home; instead of discipline, independence. I will quote a few examples of many that I have seen personally. An N.C.O. at one time quite incapable even of light duty is now running a large greyhound business with great success (and commensurate profit). A girl who could hardly walk from exhaustion and fatigue now does a heavy day's work as a civilian waitress (on excellent pay). Another N.C.O., who had outbreaks of weeping on being asked to work overtime, now he knows he is to be invalided, can be seen merrily cycling home five miles to work in his garden.

I have become very cynical of such cases. I feel that many of them think that if they make life sufficiently intolerable for their colleagues and the medical officer they will attain their object—as in many cases they do. The melancholy results obtained are not the fault of psychiatrists, unit medical officers, or the executive, but of a system which permits this escape mechanism for those unwilling to bear the heat and burden of the day—a system which lays too much stress on psychological illness and not enough on a man's responsibility to his fellows. Previously such patients had my sympathetic attention, but now I refer more and more cases to the executive for disciplinary action, with the most surprising and gratifying results. In a recent case of a senior N.C.O. dealt with in this manner he decided that hard work was more acceptable outside prison than inside.

I shall be interested to hear the experience and opinions of others on the subject.—I am, etc.,

Inverness. Kenneth G. Bergin, Wing Cmdr., R.A.F.

Penicillin and Synthetic Rubber

Sir,—I should like to reinforce the warning given by Mr. F. A. R. Stammers (Sept. 22, p. 400) against the use of synthetic rubber in apparatus for the administration of penicillin. In an experiment in which a weak solution of sodium penicillin was enclosed in sterile lengths of synthetic and natural rubber, and in glass, and kept at room temperature overnight before assaying potency, the following results were obtained:

Penicillin Solution	Zone of Inhibition of Growth of "Oxford" Staphylococcus on Seeded Agar Plate
In contact with glass	15 mm.
In contact with natural rubber	13 mm.
In contact with red synthetic rubber ..	3 mm.

It will be seen that an almost complete loss of potency occurred in the penicillin solution that was in contact with

synthetic rubber. The fact that even a natural rubber has some destructive effect upon penicillin emphasizes the need for an administration apparatus which will not require the lengths of tubing used in so many current designs.—I am, etc.,

E.M.S. Hospital, Bridge of Earn. M. E. Morgan Thomas.

Fenestration for Otosclerosis

Sir,—Your leading article on this subject (Sept. 29, p. 430) will be the focus of attention of all who have the care of these tragic cases of otosclerosis. This common disease, from the ravages of which no adolescent or adult is exempt, develops so insidiously and bilaterally that the deafness is far advanced when the patient first seeks advice. (I have yet to encounter an early case of otosclerosis.) By this time the patient is already doomed to an insidious progressive bilateral incurable deafness, which will result, with the passage of years, in a complete loss of hearing for air conduction. Otosclerosis is by far the commonest cause of an insidious bilateral deafness developing in adolescents and young adults, and is especially prone to attack young girls with otherwise unblemished health. The possibility of relief by the fenestration operation brings a ray of hope and even opens up the vista of a cure. I write to plead for the early establishment of many suitable centres in London, solely devoted to these operations; at present such facilities are meagre, if they exist at all.

Some three years ago I was consulted by an otosclerotic of about 35 who was so deaf that only a very loud shout bawled into his ear could be perceived. Tired of years of ineffectual visits from hospital to hospital he demanded that something be done for his deafness. While the audiometer revealed a bilateral loss of 60 to 70 decibels for all tones for air conduction, his hearing by bone conduction (as is usual in these conditions) remained good. I performed a fenestration operation on his labyrinth (operation time, 90 minutes) without the use of a cartilaginous spigot. The result was dramatic and exceeded all expectations. The patient could hear ordinary conversation easily at over 15 feet. Now, years later, he can still hear an ordinary conversational voice effortlessly at 8 to 10 feet, and has permanently discarded his bone-conduction instrument without which he had (previous to the operation) been unable to hear at all.

The success of this case demonstrates the miraculous and sustained restoration of good hearing to the completely deafened person—one who has invariably been told that nothing can be done for him.

Any patient suffering from advanced otosclerosis (with an air-conduction loss of more than 40 to 50 decibels) should have the opportunity of undergoing, if he so desires, the operation of fenestration of the labyrinth. The exact degree of deafness must first be ascertained by testing with the audiometer for air and for bone conduction. If the bone conduction is uniformly satisfactory there is a good possibility of the hearing being restored by operation, the exact extent varying from case to case. My operational experience bears out the statement that if the bone conduction for the high frequencies is poor the deafness is unlikely to be alleviated by the operation. I can also confirm the statement in your leader that the fenestration operation slows the progress of the disease on the operated side, the patient depending on this ear for all residual hearing at a time when the air conduction of the unfenestrated ear has been completely lost. In one case under my care the fenestration operation had been undertaken in France over 8 years ago. Loud conversational voice could be heard at up to 3 feet by the fenestrated ear (the fistula test being still positive), whereas the other ear was completely deaf.

The fenestration of the labyrinth is performed in one stage. The operation presents no undue difficulties; nor need it be unduly tedious, certainly not to the experienced mastoid surgeon supplied with adequate and trained assistance and with suitable equipment, particularly an electric bone drill. Average operation times vary from 60 to 90 minutes.

Your leader omits reference to the distressing vertigo following the operation—vertigo which may last for many weeks or even months, delaying convalescence. Tinnitus may also be troublesome. The spectre of a facial-nerve lesion resulting from the operation is one that always looms large before the surgeon—a spectre in no way diminished by the fact that nearly all the cases suitable for operation develop in handsome young females. However, one can avoid injury to the nerve, and in all my experience only one case developed, 3 weeks after the operation, a slight facial paresis which resolved in a few days.

The difficulties encountered are not only those associated with the actual fenestration. There are those of getting suitable equipment these days and of lack of suitable surroundings in which to undertake the operation, which is a "clean" one. The patient should be hospitalized in surroundings consistent with this type of operation, one in which the entire success depends on securing and maintaining freedom from infection and obtaining primary healing. There is no place where the risk of infection is greater than in the crowded wards of an ear-nose-and-throat hospital or department. This is a pity and a great handicap, as the special hospital is the place *par excellence* for the performance of this delicate operation. One may express the hope that in the new oto-rhinological era at the Royal National Throat, Nose, and Ear Hospital, which will rise phoenix-like from the ashes of the Central London Throat, Nose and Ear Hospital and the Golden Square Hospital, special wards will be set aside devoted solely to the fenestration operation for the relief of deafness due to otosclerosis, and that the scale will be of the same magnitude as that now undertaken so successfully in the clinics of the U.S.A.—I am, etc.,

London, W.1. N. Asherson.

Sir,—I read your leading article on this subject with great interest, and I admired the well-balanced exposition of a procedure which, though it "has passed the experimental stage," is still in the dawn of its usefulness. It is, therefore, with the greatest respect I would differ from the writer on a few points. I do not think the operation need be "long and tedious," nor need it "remain in the hands of a few with special aptitude." I believe it to be easily within the ability of any competent aurist who will study the anatomy and the technique. Actually, in my experience, the most difficult part of the operation is not avoiding damage to the facial nerve but the fitting of what Lempert calls the "stopple" of cartilage into the artificial opening of the canal, and this difficulty is one of instrumentation and only awaits the freeing of our surgical instrument craftsmen from other duties. There can be no doubt that if the war had not adversely affected the hospital facilities in our large cities we should now possess a fuller knowledge of the scope of this operation. As it is, we owe a great debt to Lempert and his colleagues for showing us the possibilities of an outmoded surgical procedure vitalized by modern technique. I am sure that not only has the operation come to stay, but in the near future its scope will increase and the operation be performed for types of deafness other than otosclerosis. A large field of investigation is opening up, and this is a field which the aurist returning from active service can enter on equal terms with his more fortunate colleagues.—I am, etc.,

London, W.1. Edward Carew-Shaw.

Sir,—I read with interest the leading article on fenestration for otosclerosis. As you remark the operation has now passed beyond the experimental stage and come to stay. Having recently had the privilege of working with Lempert in his clinic in New York and of closely observing his results and those of other leading aurists in other New York hospitals who are also performing the operation, I am in the position to confirm this. Discussions of the value of the operation with both the patients and the surgeons lend support to this view. I myself have worked on this operation since 1937, and it is gratifying to know that it is now being accepted.

The procedure is long, slow, and difficult, and the slightest deviation from the principles of Lempert's carefully planned technique is liable to result in failure. I was fortunate to witness Lempert perform a "revision case," where a cartilage stopple had been inserted into the fenestra 15 months earlier. On lifting the epithelial flap the cartilage stopple was found to be freely mobile. The cartilage was removed for microscopical study and a fresh one inserted. In your leading article you remark that "since the stopple is squeezed into the opening like a cork it is difficult to understand how it retains the necessary mobility." This is a misconception; the stopple is not squeezed into the fenestra but rather laid in the opening, where, being cone-shaped, it is supported by the shelving sides of the aperture and retains free mobility. My own results have so

far also borne out the advantage of using the stopple as against the earlier methods in which it was not used.

One seldom finds a patient who regards his hearing aid as anything but a tiresome necessity, and most of them feel that to regain hearing to a level sufficient to be able to dispense with the aid makes operation worth while. Apart from the rather complicated technique requiring trained assistants, the most important factor still remains the careful estimation of the remaining cochlear function. It should be borne in mind that otosclerosis also occurs in cases which may have had otitis media. This latter disease if completely resolved does not necessarily debar the patient from benefiting from the operation.—I am, etc.,

London, W.1. E. R. GARNETT PASSE.

Risks of Gastroscopy with the Flexible Gastroscope

SIR,—It is with great interest that I read the article by Drs. C. M. Fletcher and F. Avery Jones on the risks of gastroscopy with the flexible gastroscope (Sept. 29, p. 421). I, personally, experienced a similar fatal case about two years ago. Although this article should be of considerable value, especially to those whose enthusiasm for this kind of examination rather overshadows their experience, I would nevertheless like to add that in my opinion there are definite causes that contribute to these mishaps, and there are certain features about these patients and methods of procedure which, if considered, should go a long way to minimize this small but most disconcerting risk.

The three cases quoted by Drs. Fletcher and Avery Jones were in elderly women; my own case was in a woman of 63 years, and the perforation also occurred within the upper 1½ inches of the oesophagus. If one considers the normal anatomy of the oesophagus it will be recalled that the musculature posteriorly is deficient in the upper 1½ inches, there being a dehiscence of the inner longitudinal fibres, and the gap thus left is covered only by the circular fibres. The mucosa, like that of the stomach, tends to atrophy with age, especially in women; if this atrophic change occurs in the upper end of the organ an area exists which may be particularly vulnerable and liable to injury or perforation.

The tendency for many gastroscopists is to extend the head too much during introduction of the instrument. The upper end of the oesophagus becomes stretched over the bodies of the 6th and 7th cervical vertebrae and its posterior wall lies in direct contact with them, and, in the presence of an atrophic mucosa, the impact of the metal tip of the gastroscope may be sufficient to start a small tear; subsequent pressure on the delicate area by the rigid portion of the instrument against the bony background with the head fully extended would increase the damage already inflicted. Another important point is that it is impossible to obtain a circular field of vision or to visualize fully certain areas in the kyphotic subjects, and it is a great temptation to the operator to keep on extending the head in order to increase the field of vision. In these circumstances undue pressure of the rigid portion of the instrument may cause a small burst rather than a tear in the atrophied mucosa; in this type of patient the instrument is frequently passed with ease, no injury being produced during introduction. Following upon my own mishap, I always introduce the instrument with the head slightly flexed, gradually extending the head as the rigid portion passes; in addition I find that the rubber finger-tip fitted to my Hermon Taylor gastroscope is a great help in negotiating the crico-pharyngeal sphincter and the hypopharynx.

I feel convinced that if the operator is acquainted with the above anatomical and pathological points, and exercises care in introduction, even in the types of cases mentioned, the risks associated with the use of the gastroscope are really no greater than those during bronchoscopy or other endoscopic examinations.—I am, etc.,

London, W.1. HARRY FREEMAN.

SIR,—The article written by Dr. C. M. Fletcher and Dr. F. Avery Jones on the dangers of gastroscopy brings a timely warning. There is a danger that the practice of gastroscopy may be brought into undeserved disrepute if it becomes a weapon of "the occasional gastroscopist." It is still thought that gastroscopy is as easy as cystoscopy or oesophagoscopy, and that the gastroscope can be passed after reading about it or watching an expert on a few occasions.

Fletcher and Avery Jones with their vast experience show clearly how dangerous the instrument can be, even in expert hands. In my opinion they have, however, failed to emphasize sufficiently the fact that under no circumstance is force to be applied in the passage of the instrument. If the instrument sticks in the hypopharynx or in the region of the cardiac orifice it should be withdrawn slightly and another attempt made to pass it on. If it persists in sticking, force will then cause it to pass but at the expense of severe damage to the oesophagus. If the obstruction is due to spasm, waiting for half a minute and then attempting gently to pass the instrument will often succeed. If a second attempt fails, then, in my opinion, it is unsafe to continue and the manœuvre should be abandoned.

It should be borne in mind that cases occur where it is impossible to pass the instrument owing to spinal curvature or other physical abnormalities, and, while I would not go so far as to say that gastroscopy should not be attempted in these cases, I certainly would emphasize that if it is attempted not the slightest force should be employed, and that one should be prepared for complete failure. Both the Wolf-Schindler and the Hermon Taylor gastroscopes are composed of a flexible tube attached to a rigid one. Nobody would dream of passing an oesophagoscope except under direct vision, but in gastroscopy a semi-rigid tube is passed blindly. Surely in such a case no force dare be applied.

Again I deprecate the large out-patient gastroscopy clinics where patients undergo gastroscopy and are allowed to go home very soon after. Perhaps the only excuse for the out-patient gastroscopic clinic is the shortage of beds. I have made a practice of keeping every gastroscopy case in hospital for 24 hours before discharge, and though, after nearly 500 cases, I have not had a single mishap, Fletcher and Avery Jones have clearly shown that gastroscopy, like cystoscopy, is not without its dangers. Schindler has emphasized how necessary it is for the complete general examination to be made of the gastroscopy patient. This should include the spine, chest, abdomen, and throat. All my cases receive this examination, and a careful anamnesis has saved me twice from passing this instrument on epileptics. There is also the nervous, unstable, and uncooperative individual who may easily convert his examination into a catastrophe.

Gastroscopy in the edentulous, big-mouthed individual is very easy, and is apt to mislead the novice. When the opposite type of case is attempted the experienced gastroscopist knows when to desist. It is said that the good surgeon knows when not to operate, so the good gastroscopist should know when not to persevere in his attempts to pass a semi-rigid tube blindly.—I am, etc.,

St. Mary Islington Hospital, London, N.19. I. I. PRICE.

The Operation for Varicose Veins

SIR,—The comparatively new operation of ligature and injection of varicose veins is steadily becoming established. Long-term results come forward slowly, because a period of three to five years must elapse before each step can be evaluated. From time to time further points arise, and it is therefore necessary for those who have worked, talked, and written on this procedure to "pool" the information as it comes to hand. In the *Journal* in December last (1944, **2**, 814) I advocated the operation of ligature and injection at the groin and ankle. I would like to report several items which have come to my notice in connexion with this operation.

1. *Post-operative Painless Haematuria.*—The operation is occasionally followed by painless haematuria; I know of five cases. It follows in twenty-four hours. Sometimes blood appears at one or two acts of micturition; at others, throughout the day. Another surgeon has told me of a similar case. It has followed the injection of 30% saline and also of ethamolin. There were no further ill effects.

2. *Ligature and Division of the Internal Saphenous Vein in the Groin.*—In ligaturing the internal saphenous vein in the groin it has been the custom to tie the lower end of the vein once but doubly tie the upper end. I have seen the ligature on the lower end slip. It was caused by the bursting effect of the

injection of 20 c.cm. of 30% saline at the ankle. It would appear necessary to transfix both divided ends of the internal saphenous vein in the groin when it is injected at the ankle, and to make the upward insertion slowly. Further, a large excision must always be made to ensure that the internal saphenous and its branches is tied and to avoid ligature of the femoral vein or even of the femoral artery.

3. *External Saphenous Incompetence.*—With regard to incompetence of the external saphenous vein, it is at times seen without the internal saphenous vein being apparently affected. Follow-ups have shown that if the external saphenous vein is ligatured and injected at the popliteal space and the internal saphenous vein not treated, then later on the internal saphenous vein becomes affected and needs ligature and injection. Therefore, it is probably right to ligature and inject the internal saphenous vein in all cases of varicose veins where there is incompetence of the external saphenous vein or of the communicating veins.

4. *Subsequent Injections.*—Occasionally, after the remedy of ligature and injection at the groin and ankle, one or two lengths of vein remain unsclerosed and these require subsequent injection. I use ethamolin for this, and the amount needed is 1 or 2 c.cm.—larger doses tend to be followed by gross, painful, and temporarily incapacitating reactions. The ethamolin should be used from ampoules and not from a rubber-capped bottle.

5. *Pulmonary Emboli.*—I am aware of this occurring in two patients in a series of 570. One caused an illness of six weeks; another for ten days. Doubtless, there may have been other instances. The preventive measure seems to be scrupulous aseptic technique and to get the patient out of bed the day of operation. The operation is a major procedure: minor operating-theatre technique is dangerous. When the veins are gross in both legs then only one leg per session is advisable.

6. *The Scars after Ankle Incisions.*—With regard to the procedure of ligature and injection at the ankle, it is proper to mention that the scar for a few weeks is visible through silk stockings, and here again lies the need for accurate closing of the wound to avoid "eyesores" and disrepute to a first-class operation.

7. *Deaths after Operation.*—Dr. Foote recently reported a death following the operation of ligature and injection of varicose veins, and in a personal communication told me of his knowledge of it in the practice of other surgeons. So far it has not occurred with me, but doubtless I have only to keep on doing the operation before I have the experience. Knowing this, therefore, remarks on the prognosis of the operation must be appropriately expressed.

Finally, I would urge the necessity for giving full time to the operation; it is more than a minor procedure—one leg may take twenty to forty-five minutes, but the sessions are richly rewarded by the improvements bestowed on patients.—I am., etc.,

London, W.1. HAROLD DODD.

Anaesthetic Risks

SIR,—I so generally agree with what Dr. John Elam writes about anaesthetics that I have no difficulty in keeping quiet about it. His last letter (Sept. 22, p. 402), however, contains a deduction from Major Kremer's report on meningitis following spinal analgesia that seems to me unjustified, and—in so far as Dr. Elam's writings influence action, and that may be considerably—misleading. Here is the deduction: "After the publication of Major Kremer's report . . . it will be clearly unjustifiable to use spinal analgesia for operations which can properly be performed under inhalation anaesthesia." Why? Because some serious complications followed spinal analgesia under certain circumstances? But complications are not confined to spinal analgesia. We have heard of delayed chloroform poisoning, though rarely of "ether" convulsions following ether and local anaesthesia; of sepsis, gangrene, and death following intravenous anaesthesia; of insanity following gas-and-oxygen; and of innumerable deaths for which no reasonable account was forthcoming following avertin.

What were the circumstances under which these meningeal complications took place? (1) In the Middle East; (2) all but one followed the injection of more than 10 c.cm. of nupercaine; (3) the "sterile" water in which syringes that had been kept in spirit were rinsed was not sterile. What does Major Kremer say about this? "It should be possible to avoid these unhappy cases completely." And again, "Probably the most convincing evidence in favour of the infective theory is the cessation of fresh cases with the tightening up of the aseptic technique." It would seem that it is easier to maintain asepsis here than in the Middle East. In more than 8,000 cases of spinal analgesia there has not been one case of meningitis.

The advantages of spinal analgesia are so great that it is desirable to spread the knowledge and practice of it. Here are some of them. (1) It is the least toxic of all the anaesthetics; when absorbed into the blood the ratio of the maximum clinical dose to the minimum lethal dose is of the order of one to ten. (2) It produces greater muscular relaxation than any other anaesthetic. (3) It prevents neurogenic shock. Because of these qualities it renders the performance of all operations requiring muscular relaxation easier, therefore quicker, therefore less liable to infection. In the case of abdominal sections the handling of the viscera can be much gentler; there is no need for powerful retractors; hence distension and discomfort are lessened and convalescence pleasanter and more rapid. It is the best anaesthetic for orthopaedic work on bones below the diaphragm because it prevents pain impulses from reaching the brain. The sum total of all these advantages cannot but help to save lives and lessen morbidity, though it is not easy to put this in statistical form. Inhalation anaesthesia acts by interfering with and to a greater or lesser degree damaging the cerebral cells.

Let me end on a note of agreement. Dr. Elam says: "Spinal analgesia should be administered only by the full-time professional anaesthetist, thoroughly familiar with the technique and aware of the many possible dangers." No one should give a spinal anaesthetic until thoroughly trained not only in methods but in the possible consequences and how to deal with them. In other words, it requires a thorough understanding of the physiology of spinal analgesia and temperament that remains cool and efficient in emergencies. The responsibility of the anaesthetist is more immediate with a spinal than with a general anaesthetic, and seeing he is dealing with a conscious patient the demand on his powers is greater. There is no doubt of the benefit to the patient in suitable cases.—I am, etc.,

E. FALKNER HILL,
Lecturer in Anaesthetics,
University of Manchester.

Continuous Pentothal

SIR,—The *Journal* of Sept. 1 (p. 289) contains a description by Dr. Marcus Bird of another "simple apparatus for continuous pentothal." It is well known that the ingenuity displayed by anaesthetists in inventing new pieces of apparatus and new and complicated ways of doing a very simple job is a source of constant amusement to many surgeons, and the considerable amount of space devoted in the medical press to descriptions of elaborate machinery for giving continuous pentothal would certainly seem to justify the surgeons in enjoying their joke. No doubt before very long the forces of atomic energy will be unleashed in the noble cause of assisting the anaesthetist to inject pentothal into a vein.

May I submit that in spite of the useful properties of bicycle valves, glass viewers, spring tool-clips, and long lengths of rubber tubing, the best method available for continuous pentothal is still the syringe and needle, and that if such simple equipment is inadequate use may be made of two syringes and perhaps two needles. The tendency for blood to clot in the needle is undoubtedly one of the conditions that tempts the modern anaesthetist to invent an elaborate piece of apparatus (and in describing it to condemn all other forms of apparatus because they are so complicated). If, however, a wide-bore needle is used and if it is not allowed to remain full of blood it may be left in the vein with very little risk of becoming blocked. The following method has been used again and again for operations such as herniotomy, meniscectomy, craniotomy, and even thoracotomy, and requires no apparatus whatever apart from syringes and needles.

The arm is placed at right angles to the body on a pillow on an instrument table (a Mayo's table does very well), and anaesthesia is induced with a 10-c.cm. syringe containing 5% pentothal and fitted with a smallish needle. I prefer a Luer-Lok

syringe with a size 20 needle. Before the surgeon is permitted to start, even if the patient has not received the whole of the contents of the syringe, another syringe is taken, this time a 20-c.cm. for preference with a thicker needle. A Luer-Lok two-inch needle, size 18, is suitable. The needle can be inserted into the same vein as that already used, and the syringe is then secured to the forearm by a piece of "elastoplast" and the patient's wrist is bandaged to the table in case he lightens and tries to bend up his elbow. It is a great advantage to use, if at all possible, a vein an inch or two distal to the bend of the elbow, as the needle is then less easily dislodged and the syringe can be more readily strapped to the forearm in the correct position. When the syringe is empty it can be removed from the needle without dislodging the latter, especially if a long needle is used. If the arm is very slightly tilted upwards so that the antecubital fossa is a little above the level of the heart the tendency for blood to flow back into the syringe will be obviated, and the needle will normally remain full of pentothal and so be less likely to become blocked.

The method I have described can be combined with inhalation anaesthesia very easily if desired, and most of the time the anaesthetist can be sitting in his usual position at the head of the table. It takes only a moment to change the syringes. The patient is spared unnecessary discomfort if a small needle is used at first, but the use of a really large needle afterwards prevents blocking of the needle and spares the anaesthetist the necessity for using elaborate apparatus to prevent it from blocking.

Surely it is time that anaesthetists diverted their energy into more original and profitable channels and carried out the simple process of giving continuous pentothal in the simple manner that is so readily available to all who are prepared to put a needle into a vein and then inject pentothal down it, as and when necessary, with nothing more ingenious than one (or two) syringes.—I am, etc.,

J. D. Laycock,
Major, R.A.M.C.; Anaesthetic Specialist.

Blind Intubation

Sir,—I have just seen Mr. Hamilton Bailey's plea (Sept. 29, p. 440) for block anaesthesia in dealing with cases of Ludwig's angina. I think it worth while to mention the method of blind intubation in the conscious patient, the tube being passed after the nose has been sprayed with cocaine, further cocainization of the pharynx and larynx being achieved via the tube itself. Once the tube is in place, the operation can be performed under gas-and-oxygen anaesthesia, and the tube left *in situ* until the patient is again fully conscious. With this method there is no anxiety about the airway, and it can be performed by anyone with a knowledge of the technique of blind intubation.—I am, etc.,

John L. Insley.

Anaesthesia in Threatened Obstruction of Air Passage

Sir,—I have read with interest Mr. Hamilton Bailey's letter (Sept. 29, p. 440) on the question of the administration of gas-oxygen anaesthesia in cases of acute inflammation threatening obstruction to the air passage. Although I have had very little experience of cases of Ludwig's angina I have treated, on numerous occasions, acute inflammatory swellings round the pharynx, deep pharynx, and larynx, which have required surgical intervention. There is a certain amount of risk of obstruction arising even if only local anaesthesia or regional block anaesthesia is employed. If before administering gas-oxygen anaesthesia an airway is passed between the teeth, or a small wedge of rubber such as dentists use placed between the molar teeth, it will always be possible to direct a laryngeal inspection tube. It is not usually possible to insert a mouth airway owing to trismus or faucial inflammation, but it is always possible to put something in to keep the teeth from getting into contact. This form of treatment is, of course, conditional on the fact that the anaesthetist is fully acquainted with laryngeal and tracheal intubation.

The chief reason for my bringing up this question again is to draw attention to the fact that in my opinion all specialist anaesthetists should be thoroughly trained in direct laryngoscopy and bronchoscopy during operation within and around the air passage. I always feel much happier if I know that in an emergency I can call for an endoscopy set to be brought to me in a few seconds (suction should, of course, always be available). I cannot help thinking that many anaesthetic fatalities could have been avoided in the past, even where the operation for which the anaesthetic was given had no direct relation to respiration. The technique of laryngoscopy and bronchoscopy, especially the former, is not very difficult to learn.—I am, etc.,

London, W.1. D. F. A. Neilson.

Diiodo-hydroxyquinoline in Lambliasis

Sir,—The detailed report of Air Cmdre. T. C. St. C. Morton (June 16, p. 831) points to the successful use of diodoquin in cases of amoebic dysentery, particularly recommending this principle in view of its many advantages. The author points out that diodoquin has no effect on lamblia, and I should like in this connexion to refer to two cases which were treated successfully, and which are worth while mentioning as they did not tolerate atebrin—i.e., the lamblia resisted atebrin.

Case 1.—A geologist, 38 years old, suffered from diarrhoea. On examination it was found that it was caused by lamblia; he was treated with the usual method of 3×0.1 g. atebrin for five days. The attacks of diarrhoea became numerically less, but did not cease completely, and examination of the stool 10 days after completion of the atebrin cure again showed free lamblia and lamblia cysts in an abundant quantity. Diiodo-hydroxyquinoline was therefore prescribed in a dosage of 5 tablets a day for 10 days. The remarkable result was that the diarrhoea stopped within two days, and a stool examination immediately upon completion of the treatment yielded negative results. The patient has been free of complaints for more than a year now, and a recent examination of the stool did not show any lamblia.

Case 2.—A woman teacher, aged 25, who frequently suffered from spastic attacks in the right upper quadrant of the abdomen, was operated on, as *x*-ray examination showed the presence of gallstones. The attacks were thus eliminated, but periodical diarrhoea set in, which did not react to the usual therapy. An examination of the duodenal juice showed free lamblias. A test with the usual atebrin cure could not be made, as atebrin was not on the market at that time. Diiodo-hydroxyquinoline, as in Case 1, 5 tablets a day for 10 days, was therefore prescribed, with striking results, for the subjective complaints as well as the lamblia ceased to exist.

I suggest that the success of the lamblia treatment may depend on the quantity of diiodo-hydroxyquinoline administered. It has, in any case, been astonishing how promptly the desired effect set in in the two cases mentioned above.—I am, etc.,

Jerusalem. L. Schindel.

Perspex in Orthopaedics

Sir,—The article on perspex in orthopaedics (Sept. 29, p. 423) is interesting, but I should like to suggest that the authors have taken great pains to produce a plastic shell which is not as satisfactory as the plaster-of-Paris shell they use as a model. The authors list many advantages of perspex but fail to utilize them, the most important presumably being the waterproof nature of perspex, a property which can be given to plaster by means of varnish or a local waterproof shield. The other advantages are not utilized. Nobody can say the method of blowing the shell is quick or easy; the permeability to light is destroyed by the fact that condensation makes an absorbent lining essential to prevent the skin becoming sodden; and a non-ambulatory patient will not worry about the saving in weight.

I draw attention to this matter as I hope the use of perspex and allied plastic material will not be discredited by its employment in unsuitable cases. We must use the advantages to the full and avoid using this new material just because it is new and intriguing. Perspex scores on the following important points: (1) Lightness; (2) permeability to *x* rays; (3) local alterations by moulding are allowed throughout the course of treatment. In spite of what Scales and Herschell say, moulding is not easy and is a waste of time and material for short-term cases. To conclude, perspex is at present a useful expedient in many cases while a suitable "spread-on" type of plastic is being developed. It is not a universal replacement for plaster-of-Paris and should be employed only where its advantages are

utilized, such as in the splinting of peripheral nerve palsy and the fractured burnt extremity.

Regarding the processing of perspex, I gave a few hints in the *Lancet* of June 26, 1943 (p. 803), and *Journal* of Feb. 12, 1944 (p. 236).—I am, etc.,

A. MacGowan.

Experiences of a Medical Prisoner of War

Sir,—As I was one of the British M.O.s at Torun for 3½ years, may I be permitted to offer a postscript to Dr. B. Markowski's interesting article (Sept. 15, p. 361).

When British doctors were allowed to go to Stalag XXA in 1940, all the sick who had been treated by the Polish M.O.s until then were unanimous in praise of the devotion and skill with which they had been helped. Everything possible was done for the sick, despite desperate lack of drugs, instruments, and sick accommodation. After those grim early days conditions improved very much. Fort XIV remained a hospital, but most of the patients were moved into huts at ground level, and continuous pressure on the German authorities produced other improvements.

With regard to the treatment of Russians, Dr. Markowski's article hardly does justice to the atrocious conditions under which they—died. His estimate of an 80% mortality is probably true. I know that in the one month of November, 1941, out of one fort of 1,200 Russians, 270 died. The fort had been overcrowded a few months before, with only 300 British prisoners! When I arrived at Torun the diphtheria epidemic had run its course and two wards full of paralyses were left. All these showed eventual complete recovery.

Apart from very early days, starvation was not seen among British P.o.W.s in this area, except those who had been confined in the notorious military prison at Graudenz. An interesting point about the latter was that men who had been there for three months were in a much worse condition than those who had served sentences of several years. The long-term prisoners appeared to become adjusted to the insufficient ration. Unfortunately complete notes on about 100 of these cases were removed during a search and not returned: evidence of this character was never popular in Germany. Differential treatment of P.o.W.s was marked. The treatment of "Badoglio Italians" in 1943 was almost as bad as that meted out to the Red Army in 1941.

Among common diseases in a minor way various septic skin conditions took a high place. This we thought to be due to dietary deficiency. In view of the fact that a very similar high proportion of "I.A.T." is found in German P.o.W.s in this country, however, on a vastly different and well-balanced diet, one is led to think that a lack of immunity to local micro-organisms may be a more potent factor in the aetiology.—I am, etc.,

Aveley, Essex. John Kennedy.

Medical Views of Nurses' Training

Sir,—The Liverpool Hospitals Staffs Association consists of the honorary medical staffs of the nine Liverpool teaching hospitals. The following resolution was passed at a general meeting this week, and it is hoped that you will have space to publish it:

"This Association express their deep concern with the increasing trend towards demanding of nurses too detailed a theoretical and scientific knowledge, to the discouragement of practical craftsmanship. The members of this Association believe that the qualifying standard for registration should be based very largely on practical experience and vocational training. For all higher and specialized forms of nursing, a further and more scientific type of training should be demanded."

—I am, etc.,

Liverpool. A. Kirk Wilson.

Women in Labour

Sir,—Reading Dr. Kathleen Vaughan's letter (Sept. 29, p. 443) recalled to my mind, first, that some years ago the same observations on the maternal squatting position were reported in one of the medical journals, but whether by Dr. Vaughan or not I cannot now remember. Secondly, six years ago I was urgently summoned to a confinement case—a young married woman who lived alone with her crippled mother. When I entered the bedroom I was surprised to find the bed empty, but on the far side I discerned the patient naively squatting on the chamber-pot in which she had given birth to a premature baby which weighed 3 lb. and is a healthy girl to-day. The only point about all this is that if it proves anything it is that this rather simple girl, ignorant of the usual procedure and left entirely to her own instincts and resources, had adopted what is most probably the natural position for labour.

Finally my contribution, as a general practitioner of 25 years' standing (though not all spent in general practice), to those correspondents on domiciliary midwifery is, let me attend all my cases in hospital, whether they be normal or abnormal, rich or poor.—I am, etc.,

Keighley. Wright Lambert.

Sir,—In the *Journal* of June 30 (p. 925) there appears a letter from a Mr. Eric Coldrey which interested me greatly. For many years I have practised the induction of labour for the purpose of limiting the size of the child to the easy capacity of the mother. I have delivered several post-Caesarean cases without any difficulty, and a considerable number of cases with very small pelves where I had to induce at 5½ to 6 lb.

I have preached this "small baby" idea at every opportunity but have made few converts because, like Mr. Coldrey, all are afraid of using rupture of the membranes as part of the induction (and the most essential part). Rupture of the membranes is a certain and safe method of induction providing it is not done blindly. It should be done at the level of the internal os with the tip of the index finger in contact with the end of the instrument used, whether a curved long artery forceps or one of the specially made puncturing catheters. I have used this method of induction in many hundreds of cases and am convinced of its absolute safety. I use it in conjunction with the medicinal treatment mentioned by Mr. Coldrey.—I am, etc.,

M. Schwartz,

B.W.I. Chief Medical Officer, Trinidad Leaseholds Ltd.

Telling the Patient

Sir,—During a recent short visit to England I have had forcibly brought to my notice a matter which has often troubled me in the past because of its fundamental importance in the treatment of ill people. In my capacity as medical specialist I have been attached to a military hospital with a large out-patient department for a period of six weeks while awaiting my ship. What impressed me most while I worked in the out-patient department was not the obviously careful and detailed examinations and investigations lavished upon the patients by their unit doctor and by specialists (for most of the men had seen several specialists), but the fact that in only a small proportion did the patients possess accurate information regarding their particular illnesses. Most of them were quite uninformed about diagnosis, prognosis, and treatment, and when questioned would quickly show that they had their own ideas—quite inaccurate—based upon a few words picked up from their doctor or orderly.

As an example of this I can remember a man of 20 who had weakness and wasting of muscles of one leg due to anterior poliomyelitis contracted at the age of 12 years. He had an unsuitable job in the Army involving excessive use of the leg, and, in consequence, he had some discomfort. He was first seen by a medical specialist, who correctly made the diagnosis of "old poliomyelitis" and referred him to an orthopaedic surgeon. He later decided that no orthopaedic treatment was necessary. The patient, misinterpreting what he had overheard, decided that his condition had gone beyond the stage when treatment was worth while and, naturally enough, became extremely worried, both as regards his future in the Army and his future as a wage-earner. A five-minute interview in which the exact state of affairs was explained to him in simple language completely relieved his anxiety.

I encountered exactly the same difficulty in an E.M.S. hospital during the first three years of the war. The young medical men working there were keen to reach an accurate diagnosis and to apply the correct treatment as soon as possible. Many of them, however, failed to appreciate the importance of the few moments necessary to explain to the patient the points about

his illness which were important to him as a wage-earner and as one of a family. As a result of this, patients were apt to acquire quite a wrong idea of their illness from the mutterings and noddings of a group of doctors at the bedside. Surely it is a complete waste of experience, talent, and modern science if, through neglect of a simple basic principle, we are left with a correctly diagnosed and correctly treated but completely bewildered and apprehensive patient. Surely we can train ourselves to speak to patients in a language they understand and to make sure that they do understand what we are trying to tell them.

I know, Sir, that this topic is hackneyed, but I cannot believe it to have been over-emphasized yet. I hope you will find room in your columns for this letter.—I am, etc.,

J. C. Hogarth,
Major, R.A.M.C.

Doctors and the Social Trend

Sir,—When reading the *Journal* of Sept. 1 my attention was drawn to a letter from Dr. Norman P. Henderson (p. 302). Among other things Dr. Henderson refers to the Soviet full-time medical service by stating: ". . . in the event of the full-time service failing (as it has to a large measure in Russia) . . ." Far from having failed, the full-time medical service in the Soviet Union operates extremely successfully. This has been proved in peace as well as in wartime. It was, therefore, with considerable surprise that I noted Dr. Henderson's statement, and I should be interested to know what actually was in Dr. Henderson's mind when making this allegation.—I am, etc.,

London, W.2. S. Sarkisov.

Sir,—It might seem churlish to criticize the work of our Russion ally, but Drs. Culbert (Sept. 15, p. 369) and Fieldman (Sept. 22, p. 406) press the issue and make it necessary that criticism and the facts should be offered.

In *Health Protection in the U.S.S.R.*, by N. A. Semashko, the publisher's note aptly records the "great numbers of books on the Soviet Union. Indeed the lack of really precise and definite information has been noticeable as the plethora of impressions." Dr. Fieldman's references are typical additions, exemplified in Prof. Adrian's article by an enthusiastic description of how he was "dazzled as before by stately entertainment," returning laden with "gifts of reprints and books," etc. Terminating on a more sober note he finds "in physiology there have been few outstanding advances in recent years, in the U.S.S.R. or anywhere else." It seems rather trifling for Dr. Fieldman to quote "impressions" on physiology as examples of efficiency, or otherwise, of Russian State medicine. Prof. Sorsby's contribution admits that "our knowledge of Soviet medicine is at all times inadequate and at times grossly misinformed." Dr. Fieldman's third reference, *Socialised Medicine in the Soviet Union* (1937), some eight years out of date, was originally compiled for followers of the extreme left, but in parts to-day conflicts with the more moderate and modern author of *Red Surgeon* (1944), by G. Borodin. It is evident from this book that the Russian medical services did fail at times owing to the fault of organization and pathetic shortage of medical equipment, drugs, and personnel, and yet over twenty-seven years had been spent in preparation. The author laments the shortage of surgeons, and relates how physicians had to turn surgeons, with sometimes disastrous consequences. Corroboration of these facts is found in *American Review of Soviet Medicine* for Feb., 1945. Yet Dr Culbert feels that the Russian accomplishments "would hardly have been possible with any other form of organization."

In the Czarist Empire in 1913 there were fewer than 20,000 doctors, and as the authors of *Red Medicine* (1934) observe, "the people . . . outside the large cities were almost destitute of medical aid." To-day about 150,000 doctors practise, but still the number is inadequate. Nevertheless with this seven-fold increase some improvement of the health of the nation was inevitable—as indeed has come about—irrespective whether State-controlled or no control at all. When, however, we consider vital statistics of disease in Russia compared with other countries, including our own, for equal units of population the differences are striking and the backwardness of Russia apparent.

As for research, what has come out of vast organizations like the Institute of Experimental Medicine, Moscow, comparable to recent discoveries in other European countries, such as the sulphonamides, penicillin, or sex hormones? In *Science and Planned State*, by John R. Baker (1945), is the astonishing revelation that sex hormones were banned from study under the first five-year plan.

And Semashko himself states that "the most popular doctors and professors are able to earn extra money from private medical practice in addition to their salary from the State." It does seem extraordinary that such is permitted and that the Soviet service finds this additional help from private practice necessary.

Owing to limitation of space I am unable to respond to Dr. Bailey.—I am, etc.,

London, W.1. Norman P. Henderson.

*** We cannot continue this correspondence.—Ed., *B.M.J.*

Tea-making and Tuberculous Milk

Sir,—An article by Hiscox (1944) has drawn attention to the bacteriological aspects of high-temperature short-time (H.T.S.T.) pasteurization of milk. In discussing the spread of bovine tuberculosis by milk, Cutbill and Lynn (1944) drew attention to the lack of evidence of widespread habitual raw-milk drinking in the area covered by their investigation, but confirmed the almost universal practice of taking milk in tea or similar beverages.

A search through the literature failed to reveal any information about the effect of using tuberculous milk in hot beverages. The classical work of North and Park (1927) gives the thermal death-point of tubercle bacilli, and it was therefore only necessary to determine the temperatures to which milk would be exposed when used as an ingredient of tea. Surprisingly high temperatures of the order of 155° F. are retained by tea over periods up to 20 minutes after infusion—high enough to kill tubercle bacilli in 30 seconds. Where such conditions prevail infected milk would be rendered sterile. To confirm the correctness of such deductions we prepared tea in a normal household manner; five minutes later the hot infusion was poured into a cup containing heavily infected tuberculous milk. After the elapse of 30 seconds a portion was withdrawn from the cup, cooled rapidly, and centrifuged, and a guinea-pig was inoculated with a portion of the untreated deposit suspended in saline. The remainder of the deposit was stained by Ziehl-Neelsen's method and also cultured on Loewenstein's medium. Ten minutes after the initial infusion a further cup of tea was poured out, when the temperature had dropped somewhat lower, and treated exactly as the first cup. The complete experiment was repeated a few weeks later, using the same technique but different utensils and a milk inoculated with a known virulent bovine strain. The guinea-pigs and cultures were negative in all instances. The deposits from the tea-cup showed large numbers of tubercle bacilli which were apparently dead. Both raw milks produced severe general tuberculosis in guinea-pigs, and typical dysgonic strains were isolated on culture.

The conditions of tea-making and consequent temperature gradients vary so widely in practice that it would be unwise to draw too sweeping deductions from our findings. Reliance on the sterilization of milk by hot tea or other beverage without precisely defining the conditions would be folly. This protective factor does enter into epidemiological investigations of the spread of bovine tuberculosis and appears to be of a high order.—I am, etc.,

L. J. Cutbill.

References
Cutbill, L. J., and Lynn, A. (1944). *British Medical Journal*, **1**, 283.
Hiscox, E. R. (1944). *J. Soc. chem. Ind.*, Lond., **63**, 298.
North and Park (1927). *Amer. J. Hyg.*, **7**, 147.

Permission to Practise for Enemy Aliens

Sir,—I would ask the controversialists engaged in discussing the many current problems of undeniable importance to the medical profession to pause for a moment and give thought to a matter involving our humane outlook and our sense of fairness. There are in our midst a number of so-called enemy alien doctors, who, having suffered every conceivable indignity,

including, in some cases, imprisonment in the notorious Dachau camp, and what seemed to many of them a greater indignity, internment in one of our camps, were permitted by us because of our dire need to attend our sick during the later years of the war, performing their duties conscientiously and well. Permission for them to practise here ceases in February unless other arrangements are made.

I am informed that we are awaiting the decision of the Government on this question, but I cannot help feeling that in actual fact the Government is waiting for an expression of medical opinion, and I write to suggest that those enemy-alien doctors who have served us to the best of their ability during the war be granted permission to continue in practice here, for it cannot be demanded or expected that many of them would be ready to return to the land which had treated them so outrageously and caused them many years of unhappiness, such as few have to bear.—I am, etc.,

London, W.8. HAROLD H. SANGUINETTI.

Obituary

T. WILSON PARRY, M.A., M.D., F.S.A.

We regret to announce the death of Dr. T. Wilson Parry, for many years a greatly respected practitioner in North London whose antiquarian researches in a special field made him well known to archaeological circles.

Thomas Wilson Parry was born at Sydenham, Kent, on July 23, 1866, son of Joseph Chatwin Parry. From Amersham Hall School he entered St. John's College, Cambridge, in 1884, took the B.A. with honours in the Natural Sciences Tripos of 1887, and the M.A. in 1891 while doing his clinical course at St. George's Hospital. He qualified M.R.C.S., L.R.C.P. in 1892, and graduated M.B., B.Ch. in 1894, and M.D. in 1905 with a thesis on Ménière's disease, a subject to which he returned two years later in a paper read before the Tottenham Branch of the B.M.A. While in practice at Crouch End Hill Wilson Parry held a commission as surgeon-captain in the 3rd City of London Volunteer Regiment for five years, and in the war of 1914–18 he served as M.O. to the 5th Battalion of the Middlesex Regiment; he was also for many years a lecturer for the St. John Ambulance Association, which made him an honorary Life Member, and examiner for the Red Cross Society. He invented two appliances—a seton knife-needle, and a curved sublingual clinical thermometer. From 1916 onwards he published a series of papers on trephining among prehistoric and primitive peoples. The first of these was on the motives for its practice and the methods of procedure, read before the British Archaeological Association; the second, read before the History of Medicine Section of the Royal Society of Medicine, was on the prehistoric trephined skulls of Great Britain, with detailed description of the operation probably performed in each case; the third was an examination of the collected evidence of trephination of the human skull in Great Britain in prehistoric times, read at the third International Congress of the History of Medicine; and the fourth was on trephination of the living human skull, read to the Lister Society of King's College Hospital. Wilson Parry joined the B.M.A. in 1894, and twice held office in the History of Medicine Section at Annual Meetings, was a Fellow of the Society of Antiquaries and the Geological Society, and a past-president of the North London Medico-Chirurgical Society.

Sir WALTER LANGDON-BROWN writes:

Although Dr. Wilson Parry had retired from practice for a number of years he will still be remembered by many with admiration and affection. His father, a bank manager, played an important part in the defence of Lucknow. Parry was educated at Amersham Hall, then a well-known nonconformist school, which numbered amongst its distinguished alumni such men as Augustine Birrell, Buckston Browne, and Cozens-Hardy. Thence he proceeded to St. John's College, Cambridge, and to St. George's Hospital, where he held several resident appointments. He started practice at Youlgreave, Derbyshire, in 1894, but eight years later moved to Crouch End, where the rest of his professional life was spent. Sympathetic, gentle, and courteous, he endeared himself to his patients, and to these qualities was added a fine clinical acumen which made him representative of the best traditions of the general practitioner. Devoted as he was to practice, it by no means exhausted his activities; his status as an anthropologist secured his election as a Fellow of the Society of Antiquaries, and he became the leading authority on prehistoric trephining. His poetic gifts were both graceful and learned, as is shown in his sonnet sequence *Great Names* and in his fairy poems, which reveal his tender insight into the minds of children. Sincerely religious, one felt his essential goodness; he loved whatsoever things are lovely and of good report. In 1937 he became seriously incapacitated by ill-health, against which he struggled gallantly, but was able to continue with some of his literary work. It was a great joy to him that in 1942 he was well enough to be able to revisit his beloved university. But the improvement was only temporary, and the end came peacefully on Sept. 21.

In 1894 he married Miss Sophie Cole, by whom he had two sons, both now in the medical profession, and one daughter who, to their great grief, died as the result of a bathing accident at the age of 19. The sympathy of all who remember him will go out to Mrs. Wilson Parry, whose devoted care and companionship sustained him all his days.

Sir ERNEST GRAHAM-LITTLE writes:

Dr. Wilson Parry and I entered the wards of St. George's Hospital at the same time and clerked for the same physician, and a close friendship between us thus ensued which was unbroken up to his death. He was gifted in many directions as well as in medicine. He had a happy talent for verse, especially in the form of the sonnet, and was accustomed for many years to send to his friends—and I was a constant recipient—Christmas greetings conveyed in a very delightful sonnet. He had made a serious study of the history of trepanning, and had established the ancient existence of its practice by examining prehistoric skulls. He was a staunch upholder of the best ethical traditions of the profession, he enjoyed a large practice, and was much loved by a wide circle of patients. He was especially fortunate in his family life, and was greatly gratified that his two sons elected to adopt medicine as their profession.

RICHARD TRAVERS SMITH, M.D., F.R.C.P.I.

We regret to record the death on Sept. 28 of Dr. Travers Smith, late Professor of Materia Medica and Therapeutics in the University of Dublin, whose passing will be mourned by a large circle of friends, both within and outside the medical profession.

Richard Travers Smith was born on May 26, 1872, the second son of John Chaloner Smith, of Bray, Co. Dublin. He was educated at Strangeways School and later at Trinity College, Dublin, where he graduated M.B., B.Ch. in 1894, proceeding to the M.D. in 1896. Almost immediately after graduation he went to Vienna to pursue a course of postgraduate study. This was unexpectedly cut short owing to the death of his father, and he was obliged to return after a few months to Dublin and to start practice. He worked extremely hard as a general practitioner, taking many pupils whom he coached for their medical examinations, thus laying the foundation of his later work as a teacher, for which he enjoyed a well-deserved reputation. It was not long before his aim to devote himself to internal medicine was realized and he took his place as a physician on the staff of the Richmond, Whitworth, and Hardwicke Hospitals in Dublin. He became a Fellow of the Royal College of Physicians of Ireland in 1899, and was eventually a Censor of the College, and Professor of Materia Medica and Therapeutics in the University. He came over to this country in 1915 for the war, and was appointed to the Military Hospital in Colchester in charge of a medical division with the rank of major in the R.A.M.C. After demobilization he was appointed honorary physician to the Miller General Hospital for South-East London and consulting physician to the West Middlesex Hospital. After his retirement from the active staff of these institutions, on reaching the age limit, he was made honorary psychotherapist to the West End Hospital for Nervous Diseases, and continued to hold this office until the time of his death.

A correspondent writes: Those of his colleagues who knew him well and were most closely associated with his professional work will remember Travers Smith (Dick Smith, as he was affectionately known to his intimate friends) as a great gentleman and a fine physician of the old school. Although in the latter part of his career he devoted himself mostly to the practice of psychological medicine, in which he had always taken a special interest, he never let go his hold on general medicine, and the influence of his earlier training and work as a general physician was always apparent in

his outlook as a practitioner. He never forgot the patient in his pursuit of the problem of disease, and the pleasure of consultation with him was enhanced by the broad humanitarianism and the wide general culture which he brought to bear upon the purely technical aspects of his work, and which coloured his whole outlook not only on medicine but also on life in general. It is not without significance that he was one of the original members of the Association of Physicians of Great Britain and Ireland founded by Sir William Osler in 1908, election to this august body being, especially in those early days, a hall-mark of fellowship with the intellectual aristocracy of the profession.

By his colleagues in London on the various hospitals he was indeed beloved, not only for his medical experience and judgment, but especially for his good humour and for the quick and ready wit which was an integral part of his attractive personality. He was a welcome guest at medical dinners, to the enjoyment of which he added so much by his native skill as a raconteur. In private life he was a charming host, full of wide interests and with great knowledge of the arts and of the humaner letters. During the last few years of his life his health began to show signs of the wear and tear of years, accentuated by the strains and stresses of the recent war, but neither these nor the added tax imposed by a recent attack of pneumonia with other complications diminished in any wise his interest in all the finer joys of this world or impaired his gentle humour and rare companionship, which continued up to the very end. Death came to him swiftly and silently, as he would have wished. Those whom he has left, while mourning his loss, yet rejoice in his memory and are grateful for his contribution to their lives.

WILLIAM MARCUS KILLEN, M.D., M.Ch.

The death of Dr. W. M. Killen on Sept. 1 breaks almost the last surviving link between the present clinical teachers of the Belfast Medical School and those of the last century.

William Marcus Killen was born in 1863, a son of the manse, his father being the Very Rev. T. Y. Killen, D.D., who was a leading divine at that time in the Irish Presbyterian Church. Educated at the Royal Academical Institution, Belfast, he entered Queen's College, Belfast, and graduated B.A. in 1884 with first-class honours and exhibition, and in the same year was awarded the senior scholarship in natural history. Three years later he obtained the M.D., M.Ch., M.A.O. degrees in the Royal University of Ireland. After a period of study at the London Hospital, in Dublin, and in Vienna, he was appointed in 1892 assistant surgeon to the Benn Ulster Eye, Ear and Throat Hospital, Belfast. It was in this hospital that the late Dr. D. H. McKeown introduced the practice of early operation on immature cataracts and the use of a magnet for the removal of metallic foreign bodies from the eye. On the death of Dr. McKeown in 1904 Dr. Killen became senior surgeon—a post he held until his resignation in 1934, having served that institution for a period of 42 years—and during the first world war carried on the work of the hospital practically single-handed.

A colleague writes:

Quiet and unassuming by nature, and happiest in his clinical and teaching work, Dr. Killen did not seek high honours, but his colleagues in Belfast persuaded him to accept the chairmanship of the Belfast Division of the B.M.A. in 1912, and his outstanding work in his special subject led to his election to the presidency of the Irish Ophthalmological Society and vice-presidency of the Section of Ophthalmology of the B.M.A.

Dr. Killen was a great conversationalist. One of his greatest pleasures was to welcome any of his large circle of friends to his hospitable fireside, where, in the happy interchange of talk, time was forgotten. Descended from generations of clergy, he retained throughout his life an intense interest in theological problems, and sooner or later the conversation turned to such subjects as the rival doctrines of free will and predestination or the reconciliation of religious faith with scientific principles, and other kindred questions. Although brought up in a strict Calvinistic atmosphere (where even the singing of hymns and the introduction of instrumental music into the Presbyterian church service was viewed with dislike and suspicion) Dr. Killen was the most liberal-minded of men: he always studied both sides of a question and respected the other man's outlook; like Montaigne he believed that often "to know all was to forgive all." He was the most generous of men: no deserving charity was refused, private patients in difficult circumstances were treated free, and hospital patients sometimes became pensioners from his purse.

William Marcus Killen, although reaching a patriarchal age, died young, with his intellect clear and his mind elastic and receptive, and still retaining the affectionate regard of former patients, students, and colleagues.

Universities and Colleges

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

The sixteenth annual report of the Royal College of Obstetricians and Gynaecologists has been issued from its headquarters, 58, Queen Anne Street, London, W. During the year Honorary Fellowship was conferred on Dr. Hastings Tweedie, of Dublin, for his outstanding services as a teacher and practitioner of obstetrics and gynaecology, and on Sir Joseph Barcroft for his work on the physiology of the foetus. For the first time in the history of the College the Council decided to elect to the Fellowship a limited number of practitioners who are not obstetricians and gynaecologists but who have, by their scientific and other work, aided obstetrical and gynaecological practice; and Dr. Leonard Colebrook, bacteriologist, and Prof. Leonard Parsons, paediatrician, were admitted to the Fellowship. At the annual general meeting on May 26, 1945, the President, Mr. Eardley Holland, gave an account of the work that the College is doing and mentioned the problems still under consideration and awaiting solution. The two events of 1944 that concerned the College most were the publication of the White Paper on a National Health Service, and a little later the publication of its own report on a National Maternity Service. The White Paper in so far as it dealt with obstetrics and gynaecology he found frankly disappointing. It was only too evident that the machinery proposed to assist women through the reproductive period showed no improvement on the existing services.

POSTGRADUATE COURSE IN RHEUMATISM

The Empire Rheumatism Council (B.M.A. House (North), Tavistock Square, W.C.) has arranged a postgraduate course to be held from Oct. 31 to Nov. 11, both dates inclusive. The items marked with an asterisk will be held in conjunction with the annual meeting of the Heberden Society at the hospitals indicated. All the other lectures will be given in the board room of the British Red Cross Society's Clinic for Rheumatism (Peto Place, N.W.), by kind permission of the society. The programme is as follows:

Oct. 31, 4 p.m., Mr. N. Capener, "Body Mechanics—Posture and Its Control"; 5 p.m., Dr. A. Wesson, "Abnormalities of Posture and Chronic Strain."

Nov. 1, 12 noon, Prof. G. W. Pickering, "The Skin and Its Reactions"; 4 p.m., Prof. Pickering, "The Nervous System—Referred and Segmental Pain"; 5 p.m., Mr. D. V. Davies, "The Anatomy and Physiology of Joints."

Nov. 2, 12 noon, Dr. G. Kersley, "Recent Trends in Aetiological Concepts"; 3 p.m., Prof. Bruce Perry, "Rheumatic Fever"; *5 p.m., at Royal Free Hospital, Lecture-demonstration by Dr. C. B. Heald, "Recent Advances in Physical Methods in Relation to Rheumatism."

*Nov. 3, 10 a.m., at Middlesex Hospital, Lecture-demonstration by Prof. B. Windeyer, "Deep *X*-ray Therapy of Spondylitis"; *12 noon, at Middlesex Hospital, Brig. F. D. Howitt, "Social Medicine in Relation to the Rheumatic Diseases."

Nov. 4, 11 a.m., Dr. J. W. T. Patterson, "The Factor of Infection in Rheumatism and Arthritis"; 12 noon, Sir Adolphe Abrahams, "Rheumatic Symptoms in General Medicine."

Nov. 5, 12 noon, Dr. C. W. Buckley, "Spondylitis"; 4 p.m., Dr. W. Tegner, "Rheumatoid Arthritis"; 5 p.m., Dr. J. Barnes Burt, "Gout."

Nov. 6, 12 noon, Lord Horder, "The Clinical Approach to Rheumatic Disease"; 4 p.m., Dr. Ernest Fletcher, "Osteo-arthritis"; 5 p.m., Dr. W. S. C. Copeman, "Fibrositis."

Nov. 7, 12 noon, Mr. A. G. Timbrell Fisher, "The Painful Back"; 4 p.m., Dr. Hugh Burt, "The Painful Knee"; 5 p.m., Wing Cmdr. N. S. Alcock, "Sciatica"; 6 p.m., Dr. B. E. Schlesinger, "Still's Disease."

Nov. 8, 12 noon, Dr. S. J. Reynolds, "The Radiology of Normal Bones and Joints"; 4 p.m., Dr. Campbell Golding, "The Radiology of Rheumatic Disease"; 5 p.m., Dr. P. Ellman, "Psychological and Occupational Factors in Chronic Rheumatism."

Nov. 9, 12 noon, Dr. J. W. Shackle, "Methods of Investigation and Their Significance"; 4 p.m., Dr. F. S. Cooksey, "Physical Medicine, Remedial Exercises, and Physiological Rest"; 5 p.m., Dr. F. Bach, "Specialized Methods of Medical Treatment in Rheumatism."

Nov. 10, 12 noon, Dr. Kenneth Stone, "Classification and Pathology"; 4 p.m., Dr. J. Bastow, "Orthopaedic Aspects of Rheumatoid Arthritis"; 5 p.m., Mr. A. M. A. Moore, "The Surgery of Arthritic Joints."

Nov. 11, 11 a.m., Dr. M. B. Ray, "Environment, Housing, and Dietetic Factors in Relation to Rheumatic Disease"; 12 noon, Dr. L. G. C. Pugh, "Precipitating Factors—Climate, Environment, etc."

No. 38

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended Sept. 22.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1945 (a)	(b)	(c)	(d)	(e)	1944 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	39	4	15	1	—	33	6	20	4	1
Deaths		1	—				2	—		
Diphtheria	496	28	128	71	11	566	17	152	86	36
Deaths	5	1	1	—	—	8	1	1	1	—
Dysentery	270	41	132	2	—	365	34	134	—	—
Deaths				—	—				—	—
Encephalitis lethargica, acute	2	—	—	—	—	1	—	2	—	—
Deaths		—					—			
Erysipelas			41	7	—			37	15	2
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				101					68	
Deaths	71	9	26	22	5	67	3	38	17	5
Measles*	397	51	71	17	5	1,509	19	156	7	19
Deaths	2	—	—	—	—	—	—	—	—	—
Ophthalmia neonatorum			10	1	—	74	6	12	—	—
Deaths										
Paratyphoid fever	8	—	—	—	—	8	—	2	1 (B)	—
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal†	347	26	3	—	1	435	15	14	2	1
Deaths (from influenza)	4	1	1	—	—	10	—	—	—	—
Pneumonia, primary			149	8				219	18	
Deaths		17		6	8		17		5	8
Polio-encephalitis, acute	5	1				1	—			
Deaths							—			
Poliomyelitis, acute	45	1	1	9	3	16	1	11	3	—
Deaths		1					—			
Puerperal fever		5	16		—		1	14		—
Deaths										
Puerperal pyrexia‡	157	5	14	1	1	134	8	9	—	1
Deaths		—					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,361	105	271	14	36	1,696	30	322	33	54
Deaths	1	—	—	—	—	—	—	—	—	—
Smallpox	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Typhoid fever	11	—	2	6	2	12	2	2	11	2
Deaths	—	—	1	—	—	—	—	1	1	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	1,093	77	41	42	4	1,059	57	64	25	3
Deaths	6	5	—	4	—	8	—	1	1	—
Deaths (0–1 year)	335	51	58	42	14	331	33	88	41	18
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	3,813	581	537	194	99	4,124	506	614	187	123
Annual death rate (per 1,000 persons living)			12·2	12·5	§			14·1	12·1	§
Live births	6,463	814	828	369	265	6,283	414	926	386	283
Annual rate per 1,000 persons living				23·8	§			18·8	25·0	§
Stillbirths	189	23	35			191	12	37		
Rate per 1,000 total births (including stillborn)			41					38		

*Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

†Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

‡Includes puerperal fever for England and Wales and Eire.

§Owing to movements of population, birth and death rates for Northern Ireland are still not available.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* measles returns were 154 lower than last week, whooping-cough 66 lower, and dysentery 22 lower; no disease showed any appreciable increase.

The figure for measles was the smallest recorded since notification began. Scarlet fever was down by 20 cases, but there was a small rise in London, Middlesex, and Essex of 53 notifications for the combined area. The largest variations in the local trends of diphtheria were increases in Lancashire 18, Durham 15, and Yorks West Riding 12. Diphtheria incidence has steadily gone up in Lancashire during recent weeks. An irregular rise in acute poliomyelitis started at the beginning of July, and from a fairly constant level of 6 cases weekly it has risen to 45—the largest weekly total for four years.

The biggest local outbreaks of dysentery during the week were Hertfordshire, Ware R.D. 21, and Suffolk, Lowestoft M.B. 37. The other large returns were London 41, Lancashire 39, Surrey 22, Essex 15, Yorks West Riding 12.

In *Scotland* dysentery notifications went up by 30, but those for scarlet fever dropped by 22, for whooping-cough by 16, and for diphtheria by 13. The rise in dysentery was mainly in the western area, the largest returns being those of the cities of Glasgow 55, Edinburgh 17, Falkirk 13.

In *Eire* 15 fewer cases of diphtheria were notified. Whooping-cough notifications increased by 21, due to an outbreak in Dublin C.B. The incidence of diarrhoea and enteritis among infants under 2 years of age fell by 46, but remained at the high level of 101 cases, of which 84 were reported in Dublin C.B.

Week Ending September 29

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,509, whooping-cough 920, diphtheria 486, measles 406, acute pneumonia 302, cerebrospinal fever 17, acute poliomyelitis 40, dysentery 264, paratyphoid 11, typhoid 15.

Medical News

Fourteen-day refresher courses (22 sessions) for medical officers returning from H.M. Forces will begin at Addenbrooke's Hospital, Cambridge, on Monday, Nov. 5, and at Southend-on-Sea General Hospital on Monday, Dec. 3. Applications for further information and admission to these courses should be made to Dr. Firth, Trinity Hall, Cambridge.

The United Kingdom delegation to the United Nations Food and Agriculture Conference which is to open at Quebec on Oct. 16 in continuation of the work at Hot Springs, Virginia, in 1943, will include Sir Jack Drummond, F.R.S., scientific adviser to the Ministry of Food, and Dr. B. S. Platt, director of the human nutritional research unit of the Medical Research Council. The main task before the conference is to set up a permanent organization in the field of food and agriculture.

Dr. C. M. Wenyon, F.R.S., will give his presidential address on "Tropical Medicine in War and Peace" to the Royal Society of Tropical Medicine and Hygiene at Manson House, 26, Portland Place, W., on Thursday, Oct. 18, at 8 p.m. Refreshments will be served in the library from 9 p.m.

The Institution of Chemical Engineers, the Institute of Physics, and the Chemical Engineering Group of the Society of Chemical Industry announce that the one-day joint conference on "Instruments for the Automatic Controlling and Recording of Chemical and Others Processes," which was postponed in September, 1944, will take place at the Royal Institution, Albemarle Street, London, W., on Friday, Oct. 19. The purpose of the conference is to promote the interchange of knowledge and experience between those using automatic controllers and recorders in different fields and to encourage collaboration. The conference will be open to all interested, without charge.

The inaugural meeting of the Bristol Council for Rehabilitation (sponsored by the Bristol and District Divisional Hospitals Council) was held in the Council House on Oct. 4, when Mr. Harold Balme, F.R.C.S., medical officer in charge of rehabilitation, Ministry of Health, gave an address.

The Lord President of the Council has appointed Prof. R. P. Linstead, D.Sc., F.R.S., to be director of the chemical research laboratory in the Department of Scientific and Industrial Research. He was formerly Firth professor of chemistry in the University of Sheffield and in 1939 was elected to the chair of chemistry in Harvard University, U.S.A. During the war he returned to Great Britain and has rendered valuable service in relation to the application of science to war problems.

Mr. V. Zachary Cope, F.R.C.S., president of the Board of Registration of Medical Auxiliaries, will give an address on "The Place of Physiotherapy in a Co-ordinated Health Service" on Saturday, Oct. 20, at 3 o'clock, at the Royal Institute of Public Health and Hygiene, 28, Portland Place, W. The Minister of Health, the Rt. Hon. Aneurin Bevan, M.P., will take the chair. All physiotherapists are invited, but admission will be by ticket only, which can be obtained on application to the hon. secretary, Society of Physiotherapists, 24, South Molton Street, London, W.1. Student physiotherapists will also be welcome.

The Institute of Laryngology and Otology (330–332, Gray's Inn Road, London, W.C.), in association with the Royal National Throat, Nose and Ear Hospital, has arranged a five-weeks course in laryngology, rhinology, and otology for senior postgraduate students, especially those taking Part II of the D.L.O. examination, from Oct. 29 to Nov. 30. The fee for the course is £15 15s., and the full syllabus may be obtained from the secretary of the institute. Demonstrations and discussions of clinical cases will be held on Fridays at 4 p.m. from Dec. 14, 1945, to April 19, 1946, and are open to all medical practitioners without fee. Clinical assistantships and out-patient assistantships are available at both the Gray's Inn Road and the Golden Square Hospitals.

A Department of Industrial Ophthalmology has been set up at the Royal Eye Hospital, London, where the problems being investigated include: (1) Prevention of eye injuries (the type and the efficiency of preventive appliances). (2) Welders' conjunctivitis (arc eye). (3) Lens opacities in furnace workers, welders, etc. (4) Rehabilitation of the worker with one eye. (5) Eye strain of workers engaged on fine close work. (6) Eye strain due to deficient illumination during work. (7) Keratitis, conjunctivitis, amblyopia, due to the use of industrial solvents. (8) Vision and the selection of staff in industry (visual standards in industry). Industrial medical officers, factory welfare officers, safety managers, and others interested are invited to refer their problems in industrial ophthalmology to Mr. J. Minton, F.R.C.S., who has been appointed ophthalmologist to the department, at the Royal Eye Hospital, St. George's Circus, London, S.E.1.

The 37th annual meeting of the Medical Benevolent Society for the North and East Ridings of the County of York (including the City of York) was held at York on Sept. 25, by kind permission in the library of the York Medical Society, Stonegate. The report of the honorary secretary showed a most satisfactory state of affairs, the membership again having reached a new high level. Two applications for assistance were considered, and in both cases grants were made. The treasurer's audited accounts indicated that the finances of the Society were in a healthy state, and that funds were available for further investment. Great regret was expressed at the impending retirement of the honorary treasurer, Dr. Matheson Mackay, whose association with the society dates back to 1909, and who held the office of president in 1929 and 1930. Applications for membership should be addressed to Dr. W. W. A. Kelly at 92, Micklegate, York.

The Health Division U.N.R.R.A., London, invites the attention of members of the profession, below 50 years of age, who have been practising in a specialty of medicine or surgery, to the advertisement in the *Journal* of Sept. 29 for specialists for service in China for a period of about a year. This would appear to be a unique opportunity for them, not only for participating in the professional rehabilitation of our great Ally, but for obtaining fresh experience with a possibility of openings for practise in that country for those who care to remain when U.N.R.R.A. has withdrawn.

The Vice-Chancellor of the University of Leeds, Mr. B. Mouat Jones, speaking at the medical degree ceremony on Sept. 22, said that he had been notified of a considerable grant for the development of facilities for medical teaching in the university so that it would be possible to make a start on post-war schemes. With regard to the intake of new medical students, the Vice-Chancellor said that the need for more doctors had evidently impressed itself on the public. The Leeds Medical School had had 999 applications for admission in the present session and there were 75 vacancies. Already the applications for the following session were well over the available places. When building permits were eventually obtained to enlarge the accommodation to deal with an annual intake of 100—which was the maximum thought desirable and was the figure recommended by the Goodenough Committee—it would still be quite impossible to satisfy the demand for admission if it kept at its present rate. It was well that this should be generally known so that parents might contemplate alternative careers for their sons and daughters.

Mr. A. J. Bennett, previously assistant secretary, has been appointed secretary and chief executive officer of the Central Midwives Board for England and Wales from Oct. 1, in succession to Mr. Leslie Farrer-Brown.

The following members of the medical profession have been released from internment in Japanese hands: Dr. Oscar Elliott Fisher and Dr. John Groscort Reed.

Letters, Notes, and Answers

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Aitiology, Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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ANY QUESTIONS?

Pregnancy after Thigh Amputation

Q.—*A girl aged 17 had a high thigh amputation; she used crutches for two years and was then fitted with an artificial leg. She is now 22, married, and pregnant. She wishes to know whether she should continue to wear her artificial leg during her pregnancy. She is quite prepared to go back to crutches, on which she is very agile. Is there any likelihood of her two years on crutches when younger having caused any great deformation of her pelvis which might give trouble at labour?*

A.—Unless she develops any trouble (e.g., circulatory) in the stump there is no reason why the patient should not continue to wear the artificial leg during pregnancy, and it would be preferable to crutches.

By the age of 17 years the development of the pelvis is well advanced, so unequal weight-bearing at that age is much less likely to have any effect on its shape than it would have in the earlier and more formative years. At most there might be slight atrophy of the pelvic bones on the side of the amputation, or some inward displacement of the wall of the pelvis on the sound side. Even so the oblique deformity, if any, will be of a minor degree and most unlikely to cause mechanical difficulty in labour. However, it would perhaps be wise to have the pelvic shape and measurements determined radiologically, and especially if there is any doubt about the fit of the head into the brim during the later weeks of pregnancy.

Purpura after Sedormid

Q.—*With reference to the question on purpura in the* JOURNAL *of Aug. 25 (p. 271), is the purpuric reaction after sedormid likely only after prolonged sedormid treatment, or does it follow immediately after a few tablets? Which radical in the formula causes purpura?*

A.—The amount of sedormid necessary to produce purpura varies greatly. Purpura has occurred after a single tablet. In other instances the patient has taken sedormid regularly for two or three years before sensitization has developed. Between these extremes every variation in time has been seen. Details of 41 cases of sedormid purpura have been summarized by Falconer and Schumacher (*Arch. intern. Med.*, 1940, **65**, 122). There are safer alternatives which practitioners can use.

Sedormid is allyl-isopropyl-acetyl carbamide, and it belongs to the group of carbamides, or acylic ureides, in which one H of the urea ($H_2N.CO.NH_2$) is replaced by an acid radical. Other members of this group are carbromal and bromural, but they are not known to affect the blood-forming organs. The acid radical in sedormid does not look very dangerous, and presumably the complete molecule is necessary for sensitization. This group of compounds is fairly closely related chemically to thiourea and thiouracil, which have an unpleasant tendency to produce agranulocytosis.

Low Blood Pressure

Q.—*I would be glad of advice on investigation and treatment of low blood pressure in general. I am finding many patients with a systolic pressure of as little as 110 or even 95, all complaining of lassitude and lack of "staying power." Low blood pressure seriously handicaps these patients, and I would appreciate suggestions.*

A.—The range of the normal blood pressure in health may well extend down to 100 or even 95 mm. Hg. It is not so uncommon to meet healthy young people who have pressures of this level. They are often of slight asthenic build and have slow pulses. Above the age of 40 such pressures are usually abnormal. The symptoms commonly associated with hypotension are lassitude, fatigue, giddiness, weakness, faintness, and a poor capacity for exertion. Patients with such symptoms not uncommonly do not have an abnormally low pressure. So the symptoms and the pressure do not necessarily run parallel.

To gauge the significance of a low reading in any individual with symptoms one must know what his pressure is in normal health. The blood pressure depends upon several factors. It will fall in some cases of severe myocardial damage, but here the cause is obvious; an infarct is the commonest cause. At the periphery the tone of the arterioles is the most important influence. This depends on the activity of the vasomotor centre and upon the state of the arterioles themselves. This last is influenced by the secretions of the adrenals and the pituitary body, and probably also of the kidneys. Changes in the blood volume hardly come in here, and one need not discuss shock. Anaemia in some way lowers the blood pressure —perhaps both centrally (myocardial) and at the periphery. Aortic stenosis is the only valvular defect associated with low blood pressure. If these grosser and more obvious causes are excluded, one must consider the patient who comes with the symptoms enumerated above, and in whom the tension seems to be abnormally low for him. The low pressure should be regarded as part of a state of general debility, and not stressed too much as an individual item. These patients are sometimes neurotic, and fasten upon their figures of low pressure, just as hypertensives are apt to brood on theirs. A phase of debility such as this may not uncommonly follow an influenzal infection. But often nothing definite is found. One must remember the possibility of early tuberculosis. The sedimentation rate might be noted. The reaction of the blood pressure to changes in posture should be studied, taking a reading with the patient lying and then at once when standing up. Addison's disease will be indicated as a rule by other symptoms before the blood pressure falls to 110 mm. Hg.

The rare state of postural hypotension is probably a lesion of the sympathetic nervous system, and the fall to 50 or 60 mm. Hg systolic on standing is diagnostic. It is also associated with impotence and lack of sweating; it is almost entirely confined to males.

The idiopathic cases of hypotension are often difficult to treat. After infection, the usual routine of convalescence should restore the normal. Where, as so often in these days, the patient is an elderly civilian, worn out with work and worry, and probably with a deficient protein intake, a period of rest and good food, followed by a holiday in pleasant bracing surroundings, would work a cure, but this is a counsel of perfection under present conditions. Often the appetite is bad, and for some patients a little alcohol is very beneficial (if they can get it). Drugs are probably least useful, upless the patient cannot get rest and change. Strychnine in full doses, pushed to the limit of tolerance, is undoubtedly valuable. Its faded reputation is largely due to small doses in unsuitable cases. The directly pressor drugs, ephedrine or paradrine, should be tried. Amphetamine is apt to stimulate the cerebral cortex too much, and may cause insomnia if taken late in the day. Amphetamine in the morning and ephedrine in the afternoon is a good combination. The camphor preparations are of doubtful value. Desoxycorticosterone acetate is not useful except in Addison's disease.

What is First-class Protein ?

Q.—*Is any exact meaning attached to the phrase "first-class protein"? I have always taken it to indicate protein from an animal source, but would welcome an authoritative explanation.*

A.—The biological values of proteins may be measured on growing animals by the ratio of gain in weight to intake of protein, or, on adults, by the ratio of body nitrogen spared to food nitrogen absorbed. The values depend on the ratios of amino-acids in the proteins. The proteins of the endosperm of cereals contain little of some of the indispensable amino-acids: the protein of white flour, for example, contains little lysine; consequently their biological value is low. However, animal proteins can supplement these cereal proteins: for example, young rats grow as well on a mixture of equal parts of milk protein and wheat protein as on wheat protein alone. Even gelatin, which is an incomplete protein containing neither valine nor tryptophane, can supplement white flour by virtue of its high content of lysine.

The biological values of the proteins of legumes are intermediate between those of animal and cereal proteins, and they may be used to supplement the cereal proteins. The biological values of the proteins of plant cells are as high as those of the animal proteins, but their low concentration and the large amounts of cellulose in plants make them unsuitable sources of proteins for human beings unless they are concentrated in some way.

The term "first-class protein" is therefore relative: as commonly used it includes proteins from animal sources only.

Worms in Cod

Q.—*A worm is found in the cod which is about 1½ inches long, white, and turns brown in a refrigerator. A fish merchant states that it is always found in cod at this time of the year. (a) Is it a parasite of man? (b) Is it, and are its eggs, destroyed by cooking? (c) Is any treatment necessary after eating fish infected by it?*

A.—In the absence of actual specimens of the parasites it is not possible to identify them with any certainty. It is presumed, however, that the worm in question is a nematode, possibly belonging to the subfamily Cucullaninae, genera of which are found in various species of fish and, commonly, in the cod. It may be stated that they are not parasites of man, and that in any case both the parasites and their eggs, if present, would be destroyed by cooking. No treatment, therefore, is indicated in the case of human beings who may have eaten fish harbouring these parasites.

Order of Injecting Varicose Veins

Q.—*In the technique of injecting varicose veins, do you begin the course at the most distal or most proximal portion of the affected vessel, and what is the reason for doing so?*

A.—The lower two-thirds of the leg in varicose vein patients is a *locus minoris resistentiae* where ulcers, eczema, and chronic phlebitic and periphlebitic indurations are prone to develop. It is therefore unwise in well-established cases to inject the lower reaches of the leg, because a leakage here would become a chronic ulcer, and an excessive response a chronic periphlebitis and oedema; and if the disappointed patient gives up treatment these lesions would constitute a long-standing reproach. Furthermore, the treatment of the higher veins improves the condition of the lower part of the leg, so that it does not give trouble when its turn to be injected arrives. When the injections are an adjunct to ligatures, the order of injection from above down need not be observed. In cases of long previous femoral thrombosis in which varicose veins and complications have developed, the injections should be confined to the venous pools in the proximity of the complication; the injections should not be done systematically from above down as in straightforward cases.

"Boosting" Dose in Diphtheria Immunization

Q.—*I am immunizing children with A.P.T. as issued from the E.P.H.L.S. Many return for the second injection long after the recommended interval of four weeks. I should like to know: (1) Up to how many weeks or months is it efficacious simply to give the second injection of 0.5 c.cm. A.P.T.? (2) Is it more efficacious after a certain number of weeks to restart afresh with two injections properly spaced, and after how many weeks should that course be followed? (3) What is the recommended reinforcing dose to be given after four years? (4) Is a reinforcing dose of one prophylactic (e.g., A.P.T.) useful if the original prophylactic has been T.A.M. or T.A.F.?*

A.—The host's response to artificial immunization depends mostly on the adequacy of the primary stimulus: that is, the material used must be a good antigen, as A.P.T. is, and it must be given in adequate dosage. In this respect the custom of giving two doses of 0.2 and 0.5 c.cm. of A.P.T. might well be reversed to 0.5 and 0.2 c.cm., since the smallest dose of antigen will act as a secondary stimulus. In answer to the specific points: (1) If the primary stimulus has been adequate—e.g., 0.2 to 0.5 c.cm. A.P.T.—the second dose may be given as late as six months after the first and still evoke a good response. (2) After that period it may be wiser to give two spaced injections. The interval between first and second injections should not be less than one month, since, within limits, the longer the interval between injections the better the response. (3) The reinforcing or "boosting" dose need not be large: 0.2 c.cm. A.P.T. is adequate. (4) Yes: the antigen in any form will serve for the "boosting" dose; with older school-children T.A.F. is often recommended for the "boosting" dose, as being less liable than A.P.T. to produce reactions.

Neuritis after Typhus

Q.—*A colleague is suffering from intractable neuritis following typhus contracted in Australia 8 years ago. We do not see the disease in this country (New Zealand). The condition is resistant to all the usual methods of treatment, and appears to be getting worse.*

A.—Vascular lesions are characteristic of typhus, and it is possible, therefore, that the present symptoms are due to changes in the vessels giving rise to irritation of the perivascular sympathetic fibres, in which case treatment by local injections of alcohol or by sympathectomy might be considered. As, however, long-standing intractable neuritis due to typhus is unusual, all other possible causes of the symptoms should first be excluded.

Generalized Sweats

Q.—*Two women in the 50's have had severe generalized "sweats" for years. One passes urine after every "sweat." Remedies such as bromides and phenobarbitone, and endocrine treatment, fail to relieve. Laboratory investigations have given no assistance. So inconvenienced has one woman been that she has threatened suicide. The "sweats" are a colourless, odourless, painless, but profuse hyperhidrosis; in no way do they suggest "hot flushes" in either case. What can be done?*

A.—Although the ages of these patients do at first suggest an association between the sweats and the climacteric, this possibility is fairly definitely excluded by the fact that endocrine (presumably

oestrogen) therapy had no good effect. The other circumstances of the cases suggest a neurasthenic basis for the sweating. Although the effect of amphetamine might be investigated, treatment on general lines—a prolonged holiday or change in environment and occupation, hydrotherapy, combined perhaps with some sedative such as luminal—offers the best hope.

Ozone in the Factory

Q.—I am an industrial M.O. and my firm have been offered a machine which generates ozone (output not stated), which is said to reduce fatigue, destroy smells, increase oxyhaemoglobin, prevent transmission of colds, reduce oppression, and destroy bacteria, etc. Can you give any guidance?

A.—In normal persons the olfactory threshold concentration for ozone is 0.015 part per million, and irritation of the respiratory membranes occurs with concentrations greater than 0.05 part per million. The recognized maximum permissible concentration in occupied rooms is 0.04 part per million.

The addition of tolerable amounts of ozone to the air makes no detectable difference to working capacity, resistance to fatigue, or various other bodily reactions.

Ozone in permissible concentrations can inactivate certain unprotected air-borne organisms, but when such bacteria are covered with a protective coating of organic matter, as in the sprays emitted during coughing and sneezing, ozone in permissible concentrations is without effect.

A just-detectable concentration of ozone can reduce the smell of body odours enough to allow of a 50% reduction in the amount of fresh air required for odour control, but lower concentrations are valueless. However, with a given output of ozone and a constant ventilation rate, the concentration of ozone varies widely according to the atmospheric humidity, so that sometimes the concentration may be undesirably high and at other times too low to be effective. Hence, until accurate means for controlling ozone concentrations are available the use of ozone in the air of occupied rooms should be discouraged.

Pneumoperitoneum and Pregnancy

Q.—A woman aged 25 years has been treated for an apical lesion by pneumoperitoneum, began about 18 months ago. The lesion appears quiescent. The patient is now two months pregnant, and interference in the normal course of pregnancy is not warranted. How long should the pneumoperitoneum be kept up during pregnancy, and what procedure should be adopted immediately after confinement, assuming the patient went through pregnancy without ill effect?

A.—The pneumoperitoneum will clearly have to be abandoned gradually as the uterus fills the abdominal cavity. The exact treatment will depend upon the size of the uterus, but after the fourth to fifth month the refills will probably need to be smaller and less frequent, and by the sixth or seventh month it will probably be safest to cease refills altogether. The pneumoperitoneum should be reinduced as soon as possible after labour.

Psychopupillary Reflex

Q.—Please give a full account of the meaning of the term "psychopupillary reflex." What is the diagnostic value of its absence?

A.—The psychopupillary reflex is the dilatation of the pupil that occurs on receipt of a painful stimulus, or at such an emotional stimulus as startle. Its specific absence has no particular neurological significance, but according to some authorities it is sometimes observed in schizophrenia.

INCOME TAX

Car Expenses

R.S.O. holds a hospital appointment and uses a car for (*a*) private outings, (*b*) travelling between his residence and the hospital, (*c*) inside the extensive hospital grounds, (*d*) travelling for the purpose of postgraduate education, and (*e*) official journeys to visit outlying hospitals—he receives a mileage allowance in respect of (*e*). What deduction can he claim for income-tax purposes?

*** No claim can be made for the expenses incurred under (*a*), (*b*) and (*d*). As regards (*e*) any claim would be restricted to the excess of the *necessary* expense over the allowance received, and that excess would probably be insubstantial. The use of the car under (*c*) would provide grounds for a claim, but only if the use of a car for that purpose is "necessary." On the whole, therefore, only a small proportion of the total mileage of the car will rank for an income-tax claim. As regards the expenses to be taken into account, they would include running costs, insurance, repairs, and depreciation.

LETTERS, NOTES, ETC.

Binocular and Monocular Vision

Dr. F. S. Lavery (Dublin) writes: In "Any Questions?" (July 28, p. 141) the answer given to the question under the heading "Binocular and Monocular Vision" would appear to me to have missed the point. The question brings forward a matter of considerable importance and should not be dismissed by an evasive answer. What is meant by the statement that few have centralized binocular vision is that large numbers of people when engaged upon tasks, such as reading, which require visual concentration hold the object gazed at towards the side of their dominant or master eye. It is wrong to say that it is this habit which produces the dominant eye. The dominant eye is part of the sidedness of an individual and cannot be changed. As a result of training many who are natively left-sided are taught to use the right hand for actions which should be performed by their dominant hand. In these people the left eye remains the dominant eye. As a result of investigations which I and others have carried out I am satisfied that the upset in cerebral dominance produced thereby causes many disturbances, amongst which is disability in learning to read. I would refer your querist, and anybody who is interested in the subject, to "Ocular Dominance" from the *Transactions of the Ophthalmological Society*, 1943. In this communication of mine will be found data in support of the above statement and descriptions of simple clinical tests for the condition.

Anatomical Nomenclature

Mr. R. O'Rahilly, M.B., Ch.B. (Department of Anatomy, University College, Cork) writes: The comments on anatomical nomenclature by Mr. A. Hollman (Sept. 22, p. 414) are long overdue. According to the Goodenough report it is most important that "the clinical teachers and the teachers of the preclinical subjects should co-operate in securing continuity in the curriculum and a proper dovetailing of their respective teaching, so that the student's progress through the whole of the medical course may be smooth and logical." This smoothness is at present ruffled by the retention of obsolete terminologies by clinicians. Anatomical textbooks are written in the B.R., and surely clinical textbooks designed for the same students should make use of the terminology with which the student is already familiar; at least the insertion of the newer terms in addition to the older names before displaying a new edition of a surgical or physiological textbook should not be too much to ask. In conclusion I would point out to Mr. Hollman that fortunately for future medical students some of us do not find anatomy such "an uninspiring subject."

Bruising and Rheumatism

Dr. Eli Davis (London, E.3) writes: Full justice has not been done to the question on the occurrence of spontaneous "bruising" in the rheumatic diathesis (Sept. 15, p. 375). The occurrence of rheumatic symptoms in the haemorrhagic diathesis is very well known, as stressed by your contributor. But it was because the tendency to spontaneous ecchymoses in the rheumatic diathesis was so little known that I stressed this feature in the evidence I presented in papers in the *Lancet* (1941, **1**, 146; 1943, **2**, 160). Persons suffering from rheumatic diathesis are specially prone to spontaneous ecchymoses. This purpura is practically always benign.

Artificial Respiration

Capt. M. Hemming, R.A.M.C., writes: While doing artificial respiration by Eve's rocking method recently in a case of drowning, I was impressed by the increase in depth of breathing which could be attained by means of compressing the thorax on expiration and completely removing pressure as the feet went down. We were using a stretcher on a trestle, which was placed almost under the chest and enabled the sides of the chest to be pressed together; this would not be so easy if the stretcher was suspended from above.

Car Without Foot Pedals?

Dr. H. B. C. Sandiford (Felpham) writes: The answer to Dr. Rammell is an electrically driven chair. They will go up to 30 miles and are most reliable. Only the hands are used.

Disclaimer

Dr. M. E. H. Halford writes: A statement attributed to me, in relation to the treatment of a patient of Maidenhead Hospital, was published in the *Sunday Express* on Sept. 30. This publication was made without my knowledge or consent. I have not, on any occasion, made a statement regarding the treatment of a hospital patient to the *Sunday Express*.